

# MOTOR AGE

JANUARY 22, 1914

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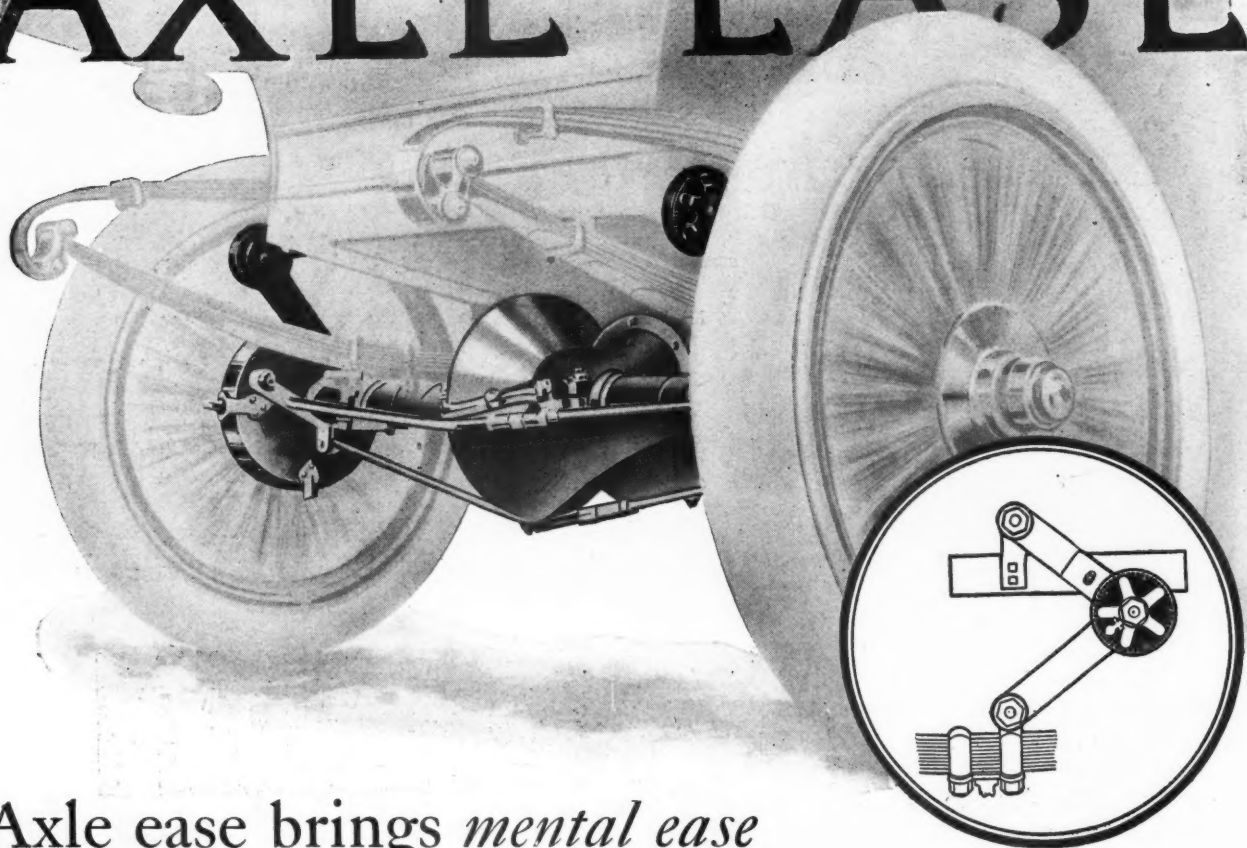
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Volume XXV

JANUARY 22, 1914

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## Contents

UNVEILING THE 1914 TRUCK.....	5
Review of the trend in construction of the power vehicles—Six-cylinder motor makes its appearance—Four-wheel-drive increasing in popularity	
YEAR TEACHES BUSINESS MAN TRUCK'S WORTH.....	10
Transportation problems made easier by power vehicles	
EDITORIAL—COMMERCIAL BRANCH OF THE MOTOR INDUSTRY..	14
SEVEN AGES OF S. A. M.....	15
Sketch of life of Manager Miles of the Chicago show	
STAGE SET FOR CHICAGO'S FOURTEENTH SHOW.....	18
Coliseum and Armory ready for exhibitors	
COMMERCIAL MOTOR VEHICLES OF 1914.....	22
Changes and features of the new year's models described and illustrated	
ACCESSORIES FOR COMMERCIAL CARS ARE MANY.....	47
Review of the new ideas offered	
MOTOR TRUCK BUYERS' GUIDE.....	50
Prices, dimensions and body styles given	
SPECIFICATIONS OF 1914 COMMERCIAL VEHICLES.....	54
Mechanical features of the 1914 chassis are given	
ON THE MINOR SHOW CIRCUIT.....	66
Detroit, Pittsburgh and Washington holding big exhibitions	
FALCON FINISHES STRENUOUS TEST.....	72
Cyclecar travels 626 miles from Cleveland to Staunton, Va.	
BUICK TESTS CARS FOR GASOLINE ECONOMY.....	73
Six-cylinder shows 20.1 miles per gallon	
SPEED AND RELIABILITY FEATURES OF MAGNETO DEVELOPMENT	74
Refinements of season described and illustrated	

## DEPARTMENTS

Manufacturers' Communications	49	Motor Car Repair Shop.....	85
Routes and Touring Information	64	From the Four Winds.....	86
Readers' Clearing House.....	82	Among Makers and Dealers....	87
Cyclecar Development.....	84	Brief Business Announcements..	88



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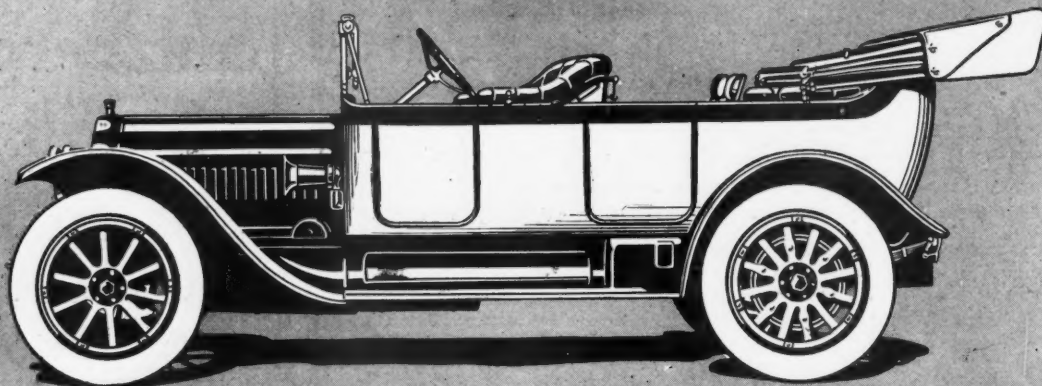
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# MOTOR AGE

## Unveiling the 1914 Truck

Six-Cylinder Motor Appears—Four-Wheel  
Drive Increasing in Popularity—  
Worm Drive Growing—  
Single-Chassis  
Favored

By Harry A. Tarantous

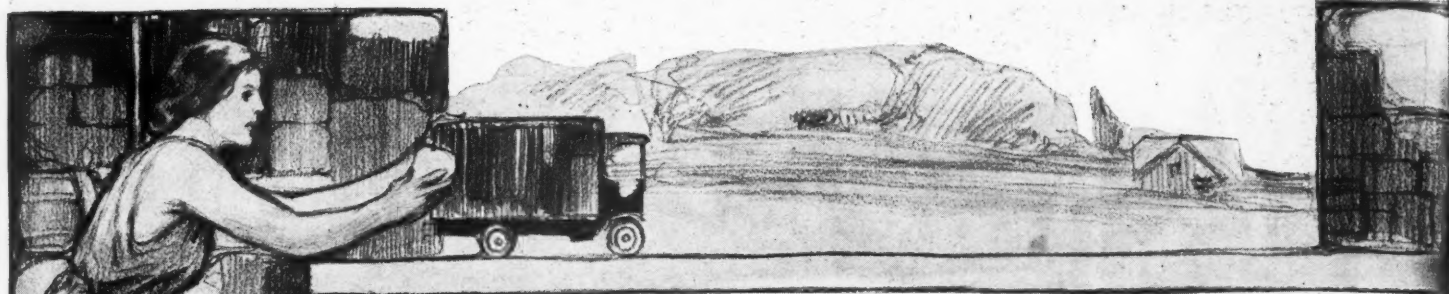
**M**OTOR truck manufacturers have lost 10 per cent of their number for 1914, this year seeing about 148 makers in the field, whereas 1913 could boast of about 165. It is surprising, however, the number of new names which appear for the first time and the advances made in truck construction. The makers of commercial cars are following in the footsteps of the passenger car builders in one respect at least, that of reducing the number of chassis in the line. Six-cylinders trucks are coming in, the two-cylinder models going out, the four-wheel drive type is stronger by far than in 1913 and the two-cycle motor as a truck possibility almost has been given up. The tires have been made larger and more attention paid to properly equipping the car with the correct type of tire. The chain-driven cars, which are in the majority, run more quietly than before, protection to the driver has not been neglected, left steer supplants the right and in the matter of body styles and construction a volume could be written on the tremendous advances made during the past year. Every conceivable type of body now is offered and the buyer need not fear that his particular requirements will not be satisfied.

In many instances only the chassis is sold and the body style omitted until our friend the buyer appears.

Further development has been in the more extended use of the worm final drive, and the dropping off in the number of side-chain vehicles. The commercial vehicles in general operate more quietly than they did and not only have the exposed parts such as the drive been made less noisy, but the motor also. In a number of instances, too, the motors are cranked by







electricity or some other powerful agent. Although only a comparatively small number of self-cranking trucks are offered, the representation is enough to mark the trend for next year.

Not only are the motors quieter, cranked by electricity and more efficient, but they are governed, that is, more makers are applying governors than before. With fuel so high priced and truck drivers so oblivious of the fact that motors use fuel, the governors have come to mean a great saving.

The trend is not complete unless mention is made of the newcomer, the cyclecar, which has made a tremendous hit as a passenger vehicle and from present indications will come in for a big share of the package-delivery car sales. Many small dealers have been looking for a vehicle capable of carrying about 500 pounds and carry it at a very fast rate, and at a price within their means. The cyclecar delivery wagon, closely approaches the ideal.

Attention has been given to properly proportioning the weight of the car over the front and rear axles. The axles have been strengthened and the weight reduced wherever possible.

#### Lower Prices This Year

As little work as possible is being left to the driver of the car, the ignition controls being automatic in a great number of cases. Steering has been made easier, especially on the heavier cars. Cooperation among the manufacturers of commercial cars has resulted in increased sales and a general lowering of prices, despite the fact that the cars are better, stronger and above all, more economical to operate than they were a year ago.

But even with all this development, all these additions and refinements, the prices of motor trucks are on the whole less than last year. In only two divisions have prices gone up, and then not enough to be se-

riously considered. A glance at the table below will show how the prices have varied since a year ago.

#### AVERAGE CHASSIS PRICE

Capacity	1914	1913
Under 1 ton....	\$1,242	\$1,114
One to 2 tons....	1,725	1,830
Two to 3 tons....	2,590	2,670
Three to 4 tons....	3,335	3,320
Four to 5 tons....	3,700	3,870
Five tons .....	4,370	4,365
Over 5 tons.....	4,870	5,140

There are 200 per cent more four-wheel drive trucks this year than there were in 1913, only the Four-Wheel-Drive and Couple-Gear boasting of the feature last year, while now the class includes the Jeffery, Nevada, Duplex and Ware also.

Apparently this type of motor vehicle is being given consideration by the engineers and it is expected that a still greater number of makers will offer the four-wheel-drive next year. Government tests conducted recently resulted in nothing but praise for the four-wheel drive contestant and the purchase of a number of such vehicles by the federal government. The gas-electric trucks, the Couple-Gear and Hexter are alone, being the only two listed operating on both gasoline and electricity, but if certain rumors are given credit there are other makers conducting tests with cars of similar construction.

Among the many new makers on the 1914 commercial car market are: Duplex, Dain, Gray, Hexter, Palmer-Meyer, Maccarr, Kosmath, Light, Ware, Nevada, New York, Signal, Merchant & Evans, Twin City and Trabold. Many of the manufacturers who have failed or had business troubles and closed shop temporarily, have come back to the field and others who have been taken over by other concerns appear, but with different names. The M. & E. formerly was called the Devon and the Horner the Grabowsky.

The commercial car industry has lost some prominent makers. The most prominent of these is the American Locomotive Co., maker of Alco trucks. Motor Age told a few months ago of the retirement of this concern from active connection with the motor industry. Among the others who have not answered roll call are Akron, Cass, Crawford, Hercules, Gramm-Bernstein, Indiana, Johnson, Randolph, Robinson, Sampson and Ford.

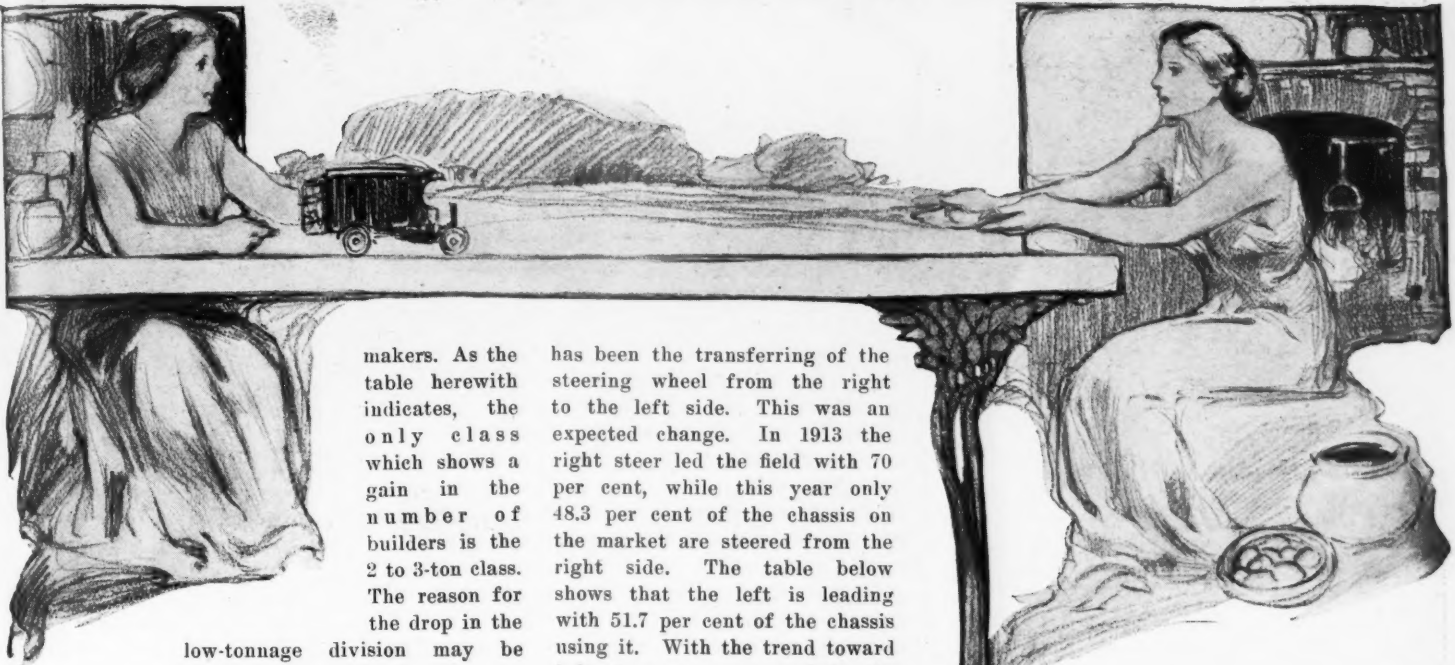
The under 1-ton class shows a loss of eight makers and the 1 to 2-ton class five

214	UNDER HOOD
55	UNDER SEAT
11	UNDER FLOOR
7	BETWEEN SEATS
5	UNDER BODY
12	SEAT & HOOD
12	OPTIONAL

NUMBER OF CHASSIS USING DIFFERENT MOTOR LOCATIONS







makers. As the table herewith indicates, the only class which shows a gain in the number of builders is the 2 to 3-ton class. The reason for the drop in the low-tonnage division may be given as due to the dropping out of the two-cylinder truck which held a prominent position in these classes.

Capacity	No. Makes		No. Chassis	
	1913	1914	1913	1914
Under 1 ton.....	63	55	162	93
One to 2 tons.....	75	70	155	139
Two to 3 tons.....	44	49	76	75
Three to 4 tons.....	55	38	99	50
Four to 5 tons.....	16	13	25	16
Five tons.....	36	24	60	35
Over 5 tons.....	11	15	14	23

The most radical change in construction

225 CHAIN	
46	SHAFT & BEVEL
21	WORM
12	INTERNAL GEAR
1	ROLLER
1	OPTIONAL

HOW THE FINAL DRIVES ARE DISTRIBUTED AMONG 1914 CHASSIS

has been the transferring of the steering wheel from the right to the left side. This was an expected change. In 1913 the right steer led the field with 70 per cent, while this year only 48.3 per cent of the chassis on the market are steered from the right side. The table below shows that the left is leading with 51.7 per cent of the chassis using it. With the trend toward left steer so pronounced in the passenger vehicles it is expected that in 1915 there will be about 80 per cent of the trucks with left steer. In this respect the commercial car builders are a year or so behind the passenger-car makers.

#### STEERING LOCATION

	Percentage	
	1914	1913
Left .....	51.7	30.0
Right .....	48.3	70.0

#### GEARSHIFT CONTROL

	Percentage	
	1914	1913
Center .....	52.3	42.8
Right .....	42.8	4.3
Left .....	4.3	0.6
Pedal .....	0.6	

Truck makers have followed the example set by the passenger-car concerns in approving the one-chassis idea. Never before have the commercial models

dwindled in number as they have this year—not in the number of sales, not in the number of cars, but in the number of chassis produced by all the American makers. Concentration upon one or two chassis has resulted in a better product, a lower price for that product and greater prosperity for the manufacturer. Where more than two chassis are offered, the general construction of the cars is similar. For example, the motor used in the 2-ton model will be the same as that used in the 3-ton offering.

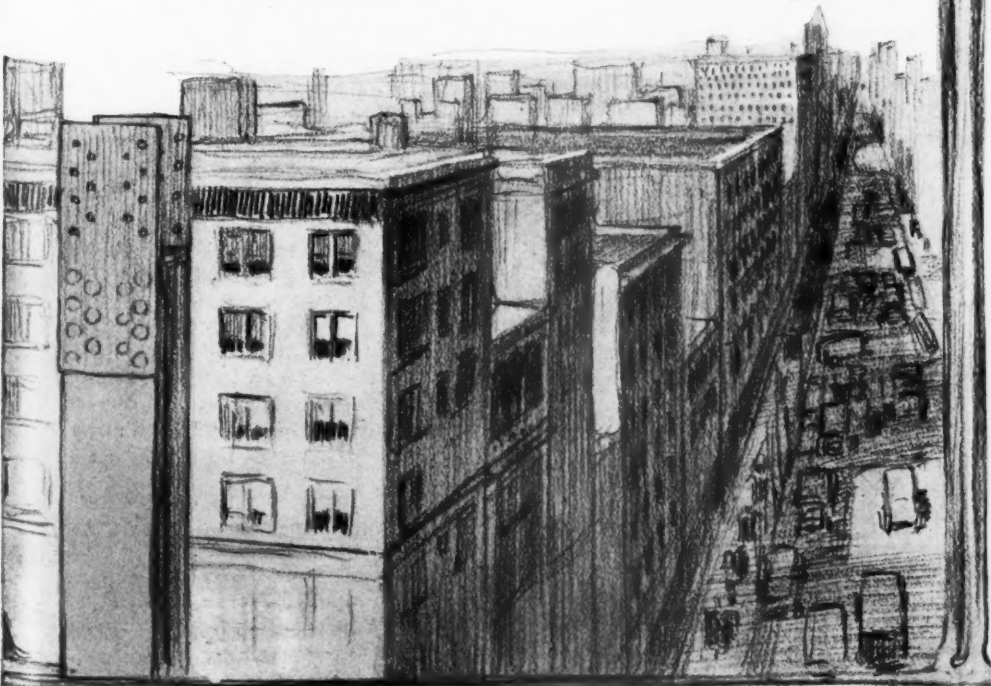
#### Two-Cycle Motor Passing

This year practically ends the career of the two-cycle motor as a commercial car power plant, only three makers equipping their cars with this type, these being the Chase, Palmer-Moore and the Veerac. In 1913 eight makers boasted of two-cycle motors. Just why this type of non-poppet should be dropped by the truck buyer is a question that has not been answered by the public.

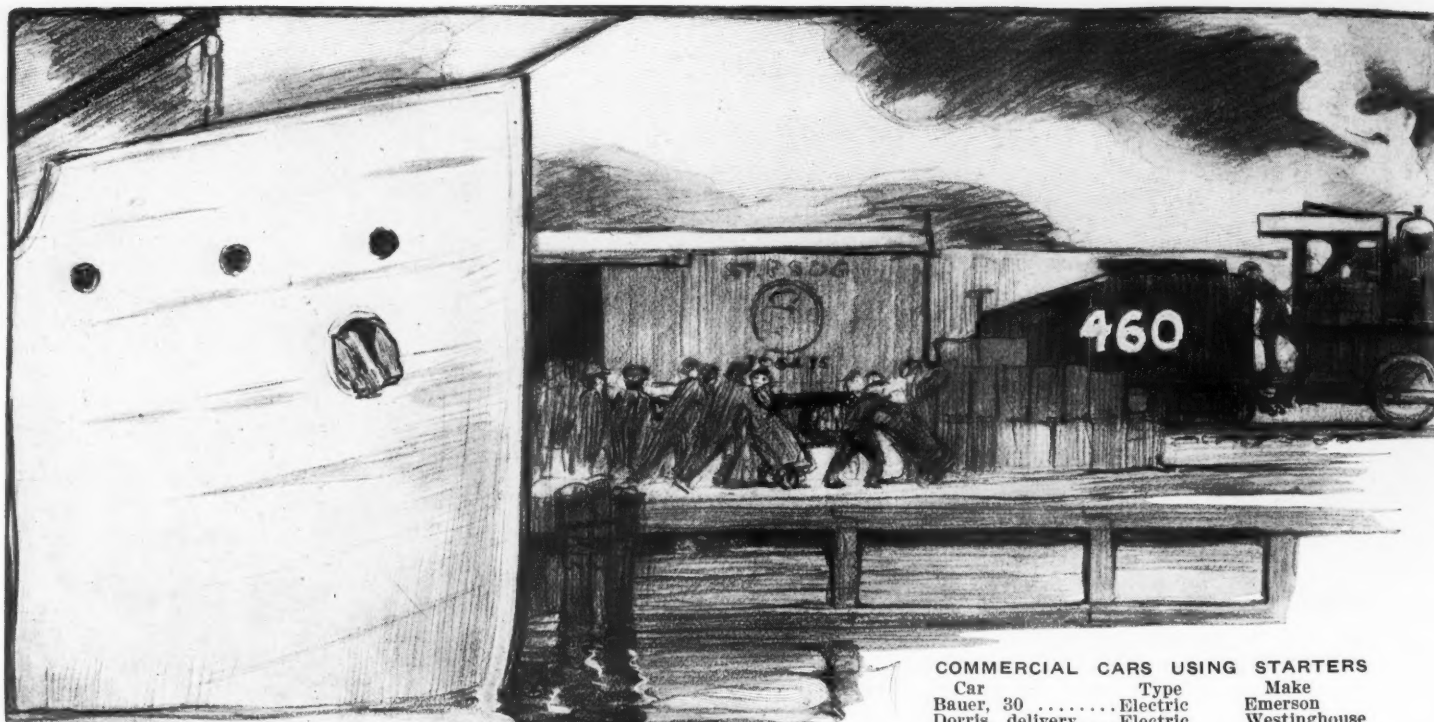
It is expected that next year will see more non-poppet motors on commercial cars. These types usually exhibit no moving parts externally and there is little for the driver of the truck to meddle with. With manufacturing costs cut down there is no reason why the rotary valve, such as the Mead or some form of Knight sleeve-valve engine, cannot be built economically for commercial car use.

The six-cylinder motor having met with the approval of the passenger-car makers, commercial car builders have conceived the idea of using sixes for trucks. In 1913 the movement was watched for six-cylinder development and 1914 sees two tried-and-true six-cylinder chassis on the market. These are the B. A. Gramm and the Great Eagle. One maker, the Armleder company, listed in the 1913 specifications with a six, now is building fours only.

With almost a 50 per cent drop in the







number of makers of two-cylinder commercial vehicles, that type of car may safely be said to be passing. Twenty-six makers were listed in 1913 with two-cylinder trucks and of these but fourteen have survived the year. The representation is good undoubtedly, but such a loss is an indication of lack of two-cylinder appreciation by the truck buyer. The well-founded concerns such as Autocar, Anglaize, Koehler, Little Giant, Sullivan, etc., may always have a following, but the predominance of the four and the squeezing in of the six, makes things look rather blue for the two-cylinder. The passing of this type from the pleasure car field occurred last year. In the two-cylinder class in 1913 the majority of the motors were of the two-cycle type, while this season the four-cycle, two-cylinder is the leader in its class. Perhaps this lack of recognition of the two-cylinder is due to the advent of the long-stroke motor, as the motor set crosswise in the frame calls for a comparatively short-stroke motor.

The two-cylinder cars which do appear are mostly in the low-tonnage classes, the heavier cars having discarded the two-cylinder almost entirely last year. With long-stroke fours on the market and long-stroke being drummed into the buyer's head the selling of a short-stroke two is difficult.

The following table shows that the four-cylinder motor is far in the lead with 92.2 per cent of the chassis using it. It will be noted there is .3 per cent one-cylinder cars. This percentage calls for one chassis and it is listed as the Wade in the specification tables on pages 54 to 63 inclusive.

#### NUMBER OF CYLINDERS

	Percentage
Four .....	92.2
Two .....	4.9
Three .....	1.9
Six .....	0.7
One .....	0.3

Nothing unexpected has occurred in the matter of gearsets, the selective leading by a big margin over the nearest competitor, the progressive, as is shown by the table below.

#### TYPE OF GEARSET

	Percentage	1914	1913
Selective .....	81.0	77.2	77.2
Progressive .....	6.4	3.7	3.7
Planetary .....	4.9	8.9	8.9
Friction .....	4.0	5.9	5.9
Individual clutch .....	3.4	4.3	4.3
Hydraulic .....	0.3	...	...

To further illustrate that designers have made it easier for the drivers, the hand ignition control has been taken away in many instances. A loss of 4.1 per cent in the hand control of the spark is noted, the fixed, automatic and governed all showing a gain. It is to be expected that the hand control for commercial cars will gradually fall away, and the time is not distant when all trucks will have some form of automatic control.

#### IGNITION CONTROL

	Percentage	1914	1913
Hand .....	66.4	70.5	70.5
Automatic and governor .....	18.4	14.9	14.9
Fixed .....	15.2	14.6	14.6

This is the first year in which the hand crank has started on its journey to the scrap heap. In 1913 not one maker listed a motor-cranking system as stock while this year sees no fewer than twelve doing this, and the buyer should not forget that even with these installations the average price has dropped. The twelve makers list seventeen chassis with self-cranking motors.

The following table shows the makers of commercial cars and the make and type of cranker which is given as stock equipment, on their vehicles.

#### COMMERCIAL CARS USING STARTERS

Car	Type	Make
Bauer, 30 .....	Electric	Emerson
Dorris, delivery .....	Electric	Westinghouse
Gabriel, H. ....	Electric	North East
B. A. Gramm, 2-ton .....	Electric	.....
B. A. Gramm, 2½-ton .....	Electric	.....
B. A. Gramm, 5-ton .....	Electric	.....
Great Eagle, A. ....	Electric	Auto-Lite
Great Eagle, D. ....	Electric	Auto-Lite
Hupmobile, 32 .....	Electric	Westinghouse
Knox, 31 .....	Electric	Berdon
Knox, 32 .....	Electric	Berdon
Marmon, delivery .....	Acetylene	Disco
Martin, A. ....	Electric	North East
Martin, B. ....	Mechanical	Ever Ready
S & S, A. ....	Electric	Deaco
Studebaker, delivery .....	Electric	Wagner
Ware, A. ....	Air	.....

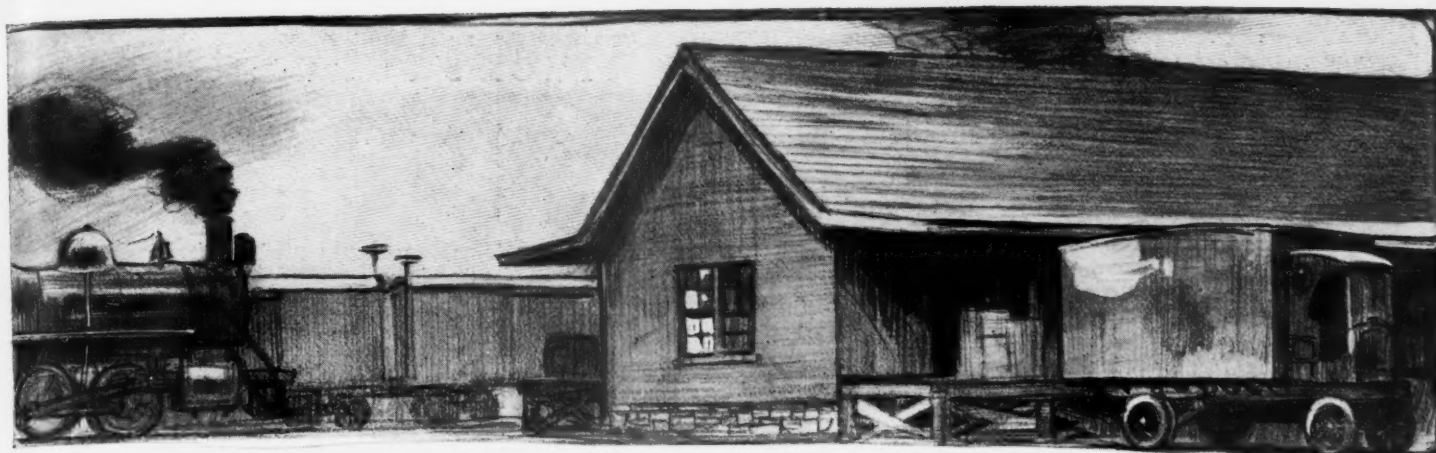
It almost is self-evident that cranks, whether electric, air or mechanical, will be as much a part of the truck next year as it is of the passenger car this year. Recently an engineer discussing the subject said that for owners whose trucks were accustomed to making long stops, the electric cranker is invaluable and saves time, or in other words, money. When a truck backs up for loading or unloading, especially on a winter's day, the motor may be shut down. "Can you show me a truck driver who will crank his motor more than twice without taking a 5-minute rest?" he asked. It may be true that time is saved, but the saving in fuel in the warmer weather and even in the cold days, is enough to make up for the cost of the cranker in a short time.

Drivers usually keep the motor running if a stop of even 5 minutes is made. "I don't want to crank that thing twenty times a day," is the sentiment. So the motor runs and the fuel bill rises. With the cranker the motor would be shut down at every opportunity, because the driver knows that by pressing a button the motor will start. The starter for trucks must come.

158 LEFT
148 RIGHT

#### NUMBER OF CHASSIS USING LEFT AND RIGHT STEER





Truck motors are more silent than ever before and are almost on a par with those used in pleasure cars. Helical timing gears have come to stay as they have in the passenger-vehicle motors. The inclosing of the valve mechanism also means quieter operation, and this is more in evidence this year than it was in 1913. Silence has been carried farther than the motor as will be seen when final drives are discussed.

The motors are of L-head construction in 75.2 per cent of the cases with the T-head type a poor second with 18 per cent following. The table below shows the percentage for the other types also.

Although block cast motors are a little in the lead, the pair-cast is almost on an equal basis with it. But the cast in block type is expected to far outnumber the others before another year is over, just as it is well in the lead in the pleasure car type.

#### SHAPE OF CYLINDERS

	Percentage
L-head .....	75.2
T-head .....	18.0
I-head .....	4.6
2 cycle .....	2.2

#### HOW CAST

	Percentage
Block .....	44.2
Pairs .....	43.2
Separate .....	12.3
Threes .....	0.3

The motor of the average 1914 commercial has a bore of 4.21 inches and a stroke of 5.20, giving it a stroke bore ratio of 1.24 to 1 which is almost equal to the average stroke-bore ratio for pleasure cars—1.28-1. There is greater need for the long stroke in the commercial cars whose motors are nearly all of the four-cylinder type while the pleasure cars have a good six-cylinder representation.

It is expected that next year will see the stroke of the average commercial car longer still, unless sixes come in, in large numbers, a condition hardly possible. The average commercial car has an S.A.E. horsepower rating of 28.3 and this will drop un-

doubtedly next year because of the expected decrease in the average bore. The table shown herewith gives data concerning the average of all the commercial cars on the market for 1914.

#### AVERAGE OF ALL 1914 COMMERCIAL CHASSIS

Capacity in pounds.....	5,004
Price .....	\$2,840
Gear ratio .....	7.84-1
Bore in inches.....	4.21
Stroke in inches.....	5.20
S. A. E. horsepower.....	28.30
Wheelbase in inches.....	129

#### FINAL DRIVE

	1914	Percentage	1913
Chain .....	73.6		84.0
Bevel .....	15.3		12.6
Worm .....	6.9		1.9
Internal gear .....	3.9		1.0
Roller .....	0.3		...
External gear .....	...		5

All the motors, whether of two, four or six-cylinders, have been refined, refined not only with the selling problem in view, but also brought to a point where the driver of the car is scarcely called upon to lift the hood. The carbureters have been studied and are better able to handle the low-grade of fuel on the market. The adjustments have been simplified and the installations made easier.

Ignition has been given much attention. The single system has risen as it has in the pleasure cars but the advances made here are much greater. The tabulation below shows a rise of 10.5 per cent since 1913 which is only one indication that simplicity has been an object of motor truck designers. The dual and double systems have lost ground while the duplex idea has come in with favor. This system is used by Bosch and enables the motor to be started with a single quick turn of the crank. It utilizes the battery current for starting, but the battery current is sent through the magneto armature and thus assists the magneto.

#### IGNITION SYSTEMS

	1914	Percentage	1913
Single .....	36.7		26.2
Dual .....	47.2		53.7
Double .....	12.7		14.6
Duplex .....	1.9		...
Two-point .....	.9		...
Optional .....	.6		3.5

More interest and engineering work has been centered about the drive from the gearset to the rear wheels and although the drive by double side chains claims a following of 73.6 per cent of all the chassis

on the market, it is losing its hold. Chain-driven cars have dropped from 84 per cent adherents in 1913 to the figure given above. The bevel drive, for the small cars especially, has made a gain and on the whole an advance of 2.7 per cent is noted in this feature.

Internal gear drive has prospered, due to the rise in the number of four-wheel drive trucks. The worm, owing to its development by engineers, has jumped from a 1.9 per cent following in 1913 to 6.9 per cent this year. The recent meeting of the truck standards division of the S.A.E. brought out some interesting information on the relative efficiency of the different types of final drive, and it was stated that comparisons of constructions should be based on simplicity, weight, efficiency and cost. The single-reduction bevel is applicable only to light service, and in construction is simple enough. The worm drive is regarded by many as the simplest of all, considering the number of parts used.

#### MOTOR LUBRICATION

	Percentage
Splash .....	53.3
Splash-pressure .....	35.2
Pressure .....	9.2
In fuel .....	2.3

#### LOCATION OF GEARSET

	Percentage
Amidship .....	51.3
Unit with jackshaft.....	25.9
Unit with motor.....	21.9
Unit with rear axle.....	0.9

#### CLUTCH TYPE

	1914	Percentage	1913
Disk .....	47.4		53.8
Cone .....	43.5		44.8
None .....	6.5		...
Expanding band .....	1.9		...
Contracting band .....	0.7		14

Although chains have been inclosed to give greater silence, the added part has been made at the expense of accessibility. The exposed chain drive is in the majority but it is expected that an appreciable falling off in this type will be seen next year.

On the whole our 1914 commercial car is a better job than its 1913 relative, and with the many improvements incorporated is selling at a lower average price. For 1915, we may expect more worm drives, more four-wheel trucks, left drive and center control on nearly all cars, shorter bore and longer-stroke motors, lighter trucks and the inrush of the cyclecar delivery wagon, as big movements.



NUMBER OF CHASSIS AND LOCATION OF GEARSHAFT CONTROL



# Year Teaches Business Man Truck's Advantages

## Transportation Problems Made Easier by Power Vehicles

THE past year has seen an enormous advance in the motor truck field, an advance, however, more among owners and operators of machines rather than among manufacturers, an advance of traffic and business engineering rather than mechanical development. The truck of today has the same ton-mileage possibility that it had a year ago and has but little mechanical change, but its ton-mileage probability is vastly increased. This change is due to the more rational and scientific use of the motor delivery vehicle as a business unit, the dropping of horse-pace methods used for centuries in local hauling and the

By William B. Stout

These points were not seen at first, but when the owner found that the machine was costing vastly more than a horse equipment and that it was failing in its work he did one of two things; either he cursed the truck and the truck salesman as having handed him a bunk proposition, or he seriously began to study the problem at hand. The first man after disposing of his truck dropped back to the old inefficiency which will one day work his ruin; the other has by now largely worked out his problem, and while disappointed for

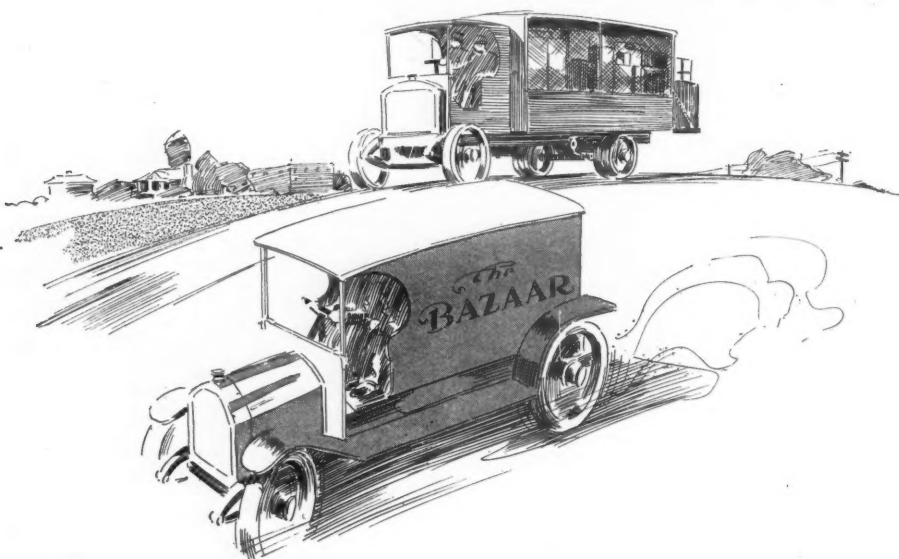
has passed its examinations. The manufacturer has been able to produce satisfactory mechanisms for the work, and the salesman now has accumulated data and knowledge so that he can go to the buyer and show him how to operate his trucks before he makes the sale. He can figure costs and the changes in system which will be necessary with more intelligence and basis of experience than was possible a year ago. As a result there is no need for the white-elephant stage of ownership, as salesmen instruct more and become better transportation engineers. We have found out that it takes more than a mere sales talker to sell motor trucks, and the modern truck man is a transportation expert.

### Experts in Charge of Trucks

Firms using large fleets of motor trucks have these in charge of experts who figure at all times the changes in system which will bring the trucks ton-mileage performance close to the ton-mileage possibility for the day's work. This, in some cases, means an entire revamping of the whole system and even a change in motor truck sizes to better fit them to the loads and mileage.

The speeds at which the trucks of different size travel safely have been pretty well found out, and this, too, gives the prospect a better basis of reasoning what he can accomplish. This speed item has a direct bearing on systems used.

For examples: in using horse systems big city department stores hauled their loads in big vans to substations and there redistributed to small one-horse rigs for quick delivery. When motor trucks were first put in they took the place of the big horse vans and ran merely to substations. These stations were expensive to maintain and took quite a force of men for short time work. The tendency today, where the street conditions about the stores allow it, is to direct route the packages from store to buyer, saving the substation cost.



*The tendency is toward smaller and faster loads, and direct delivery in department store work, with a minimum of rehandling*

adoption of modern handling systems adopted to the new transportation.

At the beginning of the motor truck industry these machines were sold to replace horse work. If a man had three teams working, a persuasive salesman with a mass of figures convinced him absolutely of the ton-mileage possibility of the motor truck as being vastly beyond that of his three teams and at a lower cost. The horse owner often bit and bought.

### Time Lost At the Start

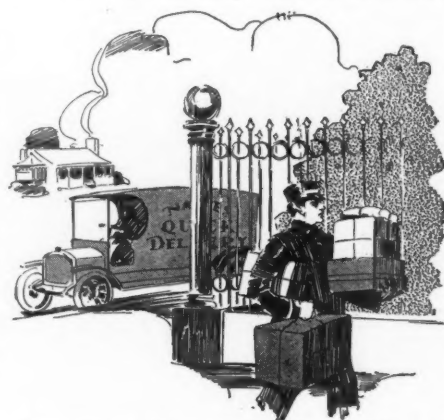
Putting the truck to work the first thing he found out was that there was a vast difference between ton-mileage possibility and ton-mileage probability. That the truck was capable of the performance the agent claimed was true, but the limitations of the connecting horse system hindered the truck making the mileage or handling the tonnage of which it was capable. The loading took too long, and the machine stood idle waiting while horse wagons were loaded ahead of it. The unloading also consumed time beyond what was necessary.

a time at the motor's performance probably is about now seeing where he can use another truck to advantage in his new system.

### A Period of Profit

This period when the truck owner has been learning how to make a white elephant, a willing worker has worked a temporary hardship on the truck industry, but this period, which has consumed the time of the truck owner in learning just what he had and how he could handle it, has been the biggest period of gain for the motor truck industry which has yet been passed. True, it is not entirely over for many merchants have but just begun to see that it takes brains to run a motor delivery, and have only begun to study the real problem of truck operation. There are enough who have graduated into the class who know how to make the motors pay, however, to form an enormous basis of quick future development.

Any business must grow up from an uncertain beginning. The truck industry has received its first period of education, and



*Improvement has been more in operation and service development rather than in mechanical development*



This is accomplished by adopting smaller units which can travel at a high speed. These load at the store direct, run from 1 to 6 miles to the delivery center and then start distributing. This saves re-handling twice with consequent loss and breakages and saves labor all around while the bundle is delivered much earlier than by the substation system. This is merely a system development but it has a wide bearing on the truck industry.

Again: at freight stations where much goods is being handled there is a change going on which very shortly will work another big step in truck development. At these points in almost every city there is great congestion and inefficiency. Teamsters seem to aim at the least number of loads possible per day and loaf about the freight yards in their own and everybody else's way. Trucks at these points wait from 15 minutes to 1 hour per load average before they can get served, or back up to a door.

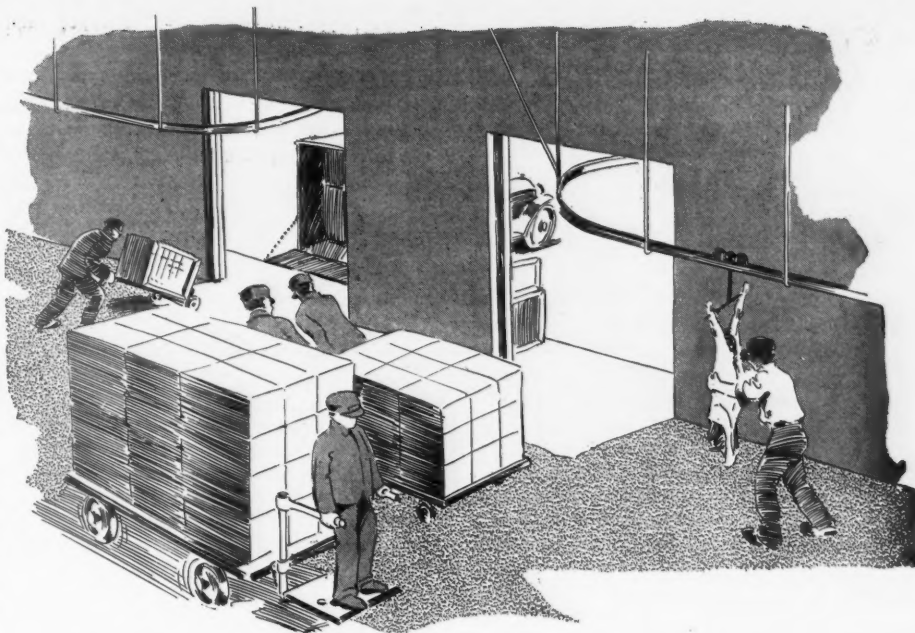
#### Lack of System Costly

Inside the service has been not much better. Here goods was stacked in piles about the floor, promiscuously in many cases, with no system, and a man looking for a consignment had to roam all about searching until he found it. The alleys between stacks were narrow and winding, and hand truckers crossed here and there, adding to the continual blockage. The type of trucks used required that the truckmen carry part of the load or balance delicately, an operation using up their energy unnecessarily and requiring a back lift of the load on starting and letting down, leaving the men tired at night and limiting their work. The railway cars on the tracks which were being loaded were often arranged in a most inefficient fashion.

Today there is coming a change. Men sending motor trucks to these points have found the railway freight stations, handled by men supposed to be traffic experts, the most inefficient and wasteful points at which trucks called. They have checked up delays and have reported and asked for better service and in some cases they have shipped by certain roads which gave their motor trucks preference at special doors. This has awakened the freight yards and traffic men, and new days are coming.

Transfer work of freight is being done in stations outside of cities to save much of city hauling. In the freight stations machinery for handling the goods has been developed. Overhead crane systems can be used in some cases and in others electric platform trucks are being adopted. These carry large loads, run at fair speed and occupy little room. They are easy to operate and have proved a great saving of time and space, where the layout of the buildings allows of their use.

Hand trucking is undergoing a change also. New systems are being perfected, and have been adopted in many places for



Modern handling systems at big service points have doubled the value of motor trucks in service

handling box goods especially. By the old hand truck method the goods is left on the floor on a stack and the trucker must lift the boxes off one at a time and thus build up his load on the hand truck. By the new method the goods is not piled on the floor in the first place but on a little bridge platform 2 or 3 inches from the floor. When the time comes to load the pile, a flat four-wheeled truck is slipped under this stack, without the touching of a box, and movement of a hand lever lifts the load free. It then is hauled to the point where it is to be loaded, on the car or motor truck, the handle let down, and the whole pile is loaded. This saves several rehandlings and consequent time.

#### Horse a Barrier to Truck

All of these points are direct motor truck gains though they are in themselves far from motor truck mechanism, and it is only when these and better systems are put to use, eliminating all of the waste possible at all freight and handling points and allowing the motor truck to run during a maximum period of time during the day, that the new goods transportation will really come into its own.

A truck cannot do its work amid a clutter of horse inefficiencies. It cannot run its best on a street filled with horse traffic. The horse and all that it stands for in the line of limited-work-per-day must go and in the place of the dirt and waste must come scientific management giving unlimited-work-per-day up to the ton-mile possibilities of the individual vehicle. This will demand a study which is more important now than the mere study of trucks, and offers probably the widest field of work open today for the ambitious young man of ideas.

The motor truck is coming, and very soon will entirely supplant the horse. The present period of hesitation on the part of the public is only while it is learning what

can be done. This learned, there will be a sudden healthy growth all down the line of motor truck and transportation engineering development which will be the real beginning of things for horseless road transport of goods. It is up to the manufacturer, the salesman and the buyer to cooperate in bringing out soon the adoption of those business methods and handling systems which will allow their vehicles to do the work they are capable of without having the tedious wasteful waits now demanded at poorly handled delivery points.

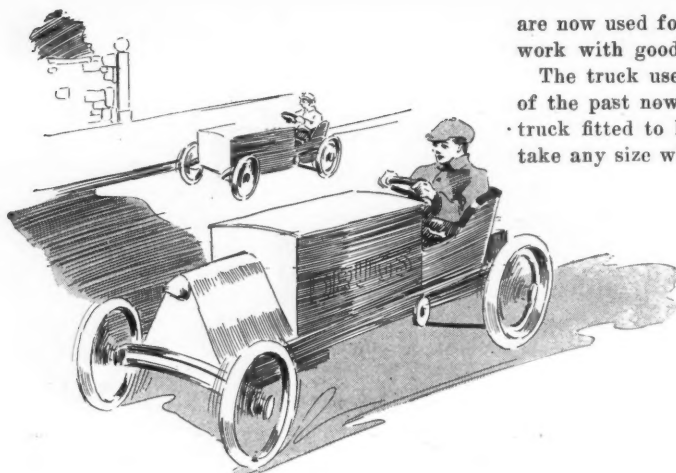
The motor truck has been built as a mechanism to fit every kind of business so far as engineers can bring it to that point. The vehicle as it now stands must be taken for granted and from this beginning and basis the business can now be made to conform to the vehicle and its limitations. The business side is the important item today in truck operation.

This year will see a far greater growth along these lines than that of last year and a more rational one. More trucks are in use, each doing its own missionary work, at every point of call, preaching the need of efficiency, of minimum idle time, of system and method. The more missionaries the more result, and the more trucks the sooner will come the day of real efficient motor transportation.

#### Parcelcars Are Developed

Another growth of the year is in the line of the smallest types of delivery vehicles. Taking the cue from the motor-cycle-and-sidecar and the newer cyclecar, makers are developing parcelcars meant to fit the field of the corner store and the one-horse-and-wagon delivery of the grocery and meat market of comparatively small financial standing. Thousands of these stores will never reach the proportion where they can afford a motor truck. The new ideas aim to give a vehicle which





*This is the first year of the cyclecar in America*

will fit this field. In this case, since the first cost and upkeep will be no more than of a single horse and wagon, the idea of system is not so important as in bigger machines, though well worth attention. The parcelcar movement is bound to spread, but parcelcars will be more than mere cyclecars with delivery bodies attached, as these designs do not go far enough for the conditions of delivery. Parcelcars must be built for the work.

The sales side of the motor truck is getting more rational year by year. The merchant takes his truck more as he would buy any piece of machinery, whereas in the past he has demanded continued service and a guarantee of a number of things far from businesslike, things which have made motor truck selling an expensive proposition. The selling of a motor truck today is a business deal more than ever, with no special inducements thrown in as a prize for the sale. This means healthy growth.

#### **Truck Owner Learns Lessons**

The truck owner's education has included a number of things. He has learned the importance of quick loading and unloading, as noted, and has devised means to cut these times short by special loading devices at the one end and the use of dump bodies, crane assistance, etc., at the other. Beyond this he has learned the wastefulness and loss of time due to overspeeding, and now, instead of racing this machine like a pleasure car, he is content with a 10-mile speed or even less on his big truck and only makes speed on trucks pneumatic-shod.

For medium-speed trucks he has learned to put pneumatic tires on the front wheels and solid rubber tires on the rear. For short haul work and many stops he is using electric wagons, for distance work and speed he is adopting gasoline. For heavy work and many stops big slow electrics are used, while for long runs and heavy going the big gasoline truck is preferred. For quick package work and house-to-house delivery in congested districts the electric now holds place with the probability that the parcelcar also will find a big field in this branch of hauling. Motorcycle-and-sidecar outfits

are now used for special delivery rush work with good success.

The truck user from the experience of the past now knows how to pick a truck fitted to his use rather than to take any size which is offered and try to fit it to work to which it is not suited. He knows the field on which each type excels, and buys accordingly. This is an important step and means much to the makers as well as the buyers, for no buyer can be satisfied with a machine not suited to its

work. One would not buy a household sewing machine for boot-and-shoe work, nor a wood auger for drilling armour plate; neither would a wise firm deliver a spool of cotton with a 5-ton four-wheel-drive gasoline-electric motor truck. As there are sewing machines and drills for different classes of work, so there are trucks for different fields. This item should be obvious, but many users are but just coming to understand this fact.

#### **The Folly of Overloading**

Again, overloading has taught lessons which leave the truck today on a better basis than formerly. It has been the custom to load a truck platform with all that it would hold, regardless of chassis limits. One may see quite frequently, even today, trucks loaded to such an extent that when the car goes over a bump the truck body hits the tires and blue smoke and a stench of rubber follows. This still happens but often if one looks up the offender he finds it is the first truck ever used by the firm owning it. They have not yet learned the lesson of overloading. The older users steer clear of overloading as a pilot avoids the rocks, knowing that neglect of this point has wrecked many a truck and has led to the failure of many a vehicle through no fault of its own makeup. The lesson which these wiser firms are living up to is a benefit directly to the tire makers and indeed to every branch of the industry. This matter of watching the machine is again a business item which has developed greatly during the past year and which is included in the important truck developments.

Cities are learning the value of motor hauling in relieving traffic congestion and already movements are on foot to establish truck thoroughfares; streets set aside especially for motor truck through routes. An attitude of hostility has given place to a belief in the motor truck and this new attitude promises much of advance for this year.

One of the biggest indications of the year was shown by the city of Chicago in its method of running an actual truck reliability run, and a series of tests observed by outside uninterested engineers as a basis

of its truck buying for the year. This run was undertaken through the efficiency bureau of the city and the enterprise of Elton Lower, and is the first trial in America undertaken by a city to obtain a direct, efficient engineering basis of actual test of motor hauling vehicles before purchasing. The truck run of over 50 miles was supplemented by tests of all kinds, so that on the completion of the work the city had a real basis to work on, unobstructed by politics of any kind. The checking, figuring and control of the run was in the hands of engineers known in the motor world and not in any way connected with truck factories or city politics so that the reported results were free from any question of influence or preference.

#### **Chicago Sets Good Example**

Future tests of this kind probably will be run under A. A. A. sanction to guarantee that the test is right. The city of Chicago through its efficiency bureau is doing things, and not the least important accomplishment has been this new attitude toward motor hauling. The example of Chicago will no doubt be followed by other cities and the result be of great benefit to the whole industry.

Again it is seen that the biggest events in the truck world during the past year, and the biggest developments are business ones rather than mechanical and are the first basis of a new foundation for the industry.

The motor truck industry never looked so promising as today. New lines are opening up, new public interest is felt, new fields for truck operation are being made possible by the adoption of new systems and the invention of new loading and handling devices. The motor truck is an established saving factor in modern life.

#### **TESTING MICHIGAN LAW**

Detroit, Mich., Jan. 19—The right of Michigan cities and towns to control motor car traffic is to be taken to the state supreme court for decision as a result of a demur filed in the case of a Detroit motorist who hit a woman while, it is said, he was violating two city ordinances in driving recklessly and without lights. The state law says that "no city shall regulate the speeding and use of motor vehicles on the streets and public highways except as specified herein." Of course this provision was made to keep towns from making unreasonable regulations but it is feared if the ordinances involved in the case are declared void that the Detroit traffic squad will become powerless. This would be a calamity for both motorists and pedestrians as the Detroit squad is very efficient. The first hearing will be held January 22.

#### **SPLITDORF IN NEW BATTERY CO.**

New York, Jan. 20—The A. & T. Storage Battery Co. of New York has been incorporated with a capital of \$1,000,000. The directors are John Splitdorf, D. B. Nally, A. L. Kull and W. C. Albers.



# Chicago Learns Lesson in Economy from Motor Truck

## City Can Save Million a Year by Using Modern Vehicles

ONE million dollars a year could be saved by the city of Chicago on street cleaning alone, if its business houses and private citizens would substitute motor trucks and motor cars for the 80,000 horses now used in the city.

On an average, every 100 horses litters the streets and alleys with 1 ton of refuse during a working day of 8 hours. This amounts to 800 tons a day, or 493,934 cubic yards in a year of 300 working days, calculating 36 pounds to the cubic foot. This is more than 50 per cent of the total of 953,856 cubic yards of street sweepings, including leaves, rubbish and dirt, annually removed by the street cleaning department. The total cost of cleaning the streets and alleys of the city during 1912 was \$1,916,217, exclusive of the garbage and ash removal, weed-cutting, etc. Fifty-one per cent of this approximately is \$1,000,000. This is the sum actually expended in 1912 to remove the dirt and filth directly attributable to the use of horses.

### Council Orders Investigation

These are figures deduced from facts published in reports by the commissioner of public works and civil service commission of the city of Chicago, recently issued following an investigation from April 21 to October 15, 1913, made by order of the city council.

"Horse-drawn vehicle traffic is the most important source of street dirt and has been given the greatest weight in the preparation of the schedules and standards used as a basis for the estimates of future work and expenditures in street and alley cleaning," says the report.

"Aside from the excrement of the animals, the constant wear of the pavements

by the horses' shoes and the iron-tired vehicles," observes the report, "has a tendency gradually to wear out the surface of the pavement, which must be removed by the street sweepers. This source is of special importance in macadam pavements, as it is this material that forms practically all of the dirt which is removed from pavements of this class."

### Horses and Spread of Disease

No attempt was made by the investigators to determine the extent to which horses are responsible for disease in the city or the financial losses to the community from this source, but it is likely that the aggregate is much larger than the expense due to street cleaning. Stables afford the most common breeding places for flies, those disseminators of typhoid and intestinal diseases, while the dried street filth blown about by the wind carries all sorts of germs into every home, office and factory in the city.

More than 600,000 tons of manure are produced yearly by the 82,000 horses, mules and cows maintained in the city. All of this has to be carted through the streets and a considerable quantity is spilled from the wagons to lie in the streets until swept up by the street cleaners.

This report, embracing more than 100 printed pages and many elaborate tables of data, is both comprehensive and exhaustive and contains much information of value. In connection with the investigation, traffic census were taken at 1,400 street intersections, with the result that "it has been definitely determined that the density of horse traffic is the principal factor which determines the number and frequency of cleanings which one street should be given."

"It was found," continues the report, "that within the last 3 years the number of motor-driven vehicles in the central portion of the city has increased over 300 per cent and that the number of one and two horse-drawn vehicles throughout the city has remained practically constant. The census on hand of motor car and street railway traffic has been used as a factor in determining the minimum cleanings which a street requires. The amount of dirt attributed directly to automobiles or street railways is inappreciable."

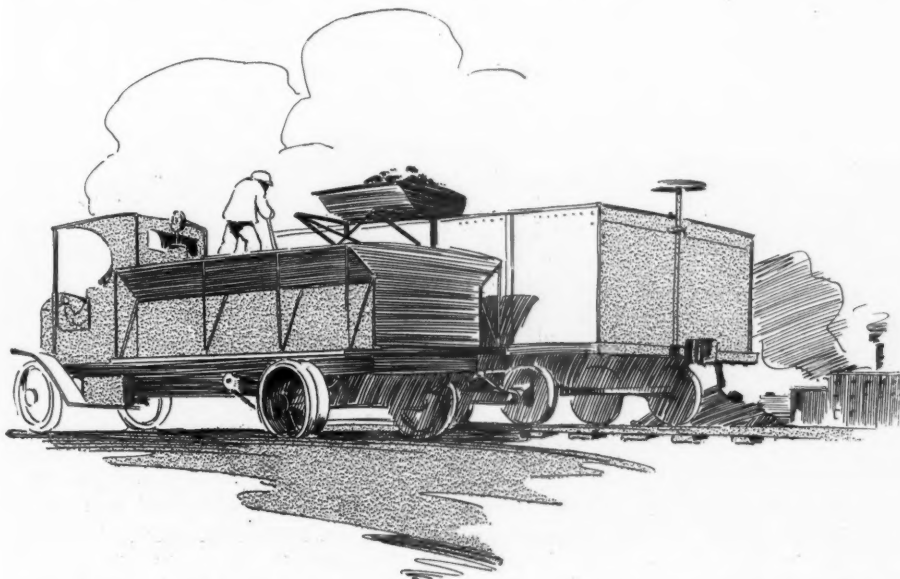
Several important conclusions may be drawn from the facts given: First, that the substitution of motor vehicles for horse-drawn vehicles will reduce the cost of street cleaning, lessen the wear of street pavements and help materially to decrease the city death rate; second, that use of motor trucks by the street-cleaning department will effect further savings in the cost of street cleaning and ash and garbage disposal; third, that the elimination of horses will preserve street pavements; and fourth, that replacement of macadam pavement by more permanent pavement will lower the cost of street cleaning and maintenance.

### Statistics on Street Repair

Referring to street repairs, the report makes the important observation that "where the cost of repair and maintenance is equal to or even greater than the annual interest cost on new work, it is more desirable that new pavements be laid where possible." The average cost of repairing and improving 55 miles of macadam country roads within the city limits is estimated at \$750 a mile. This represents 6 per cent interest on \$12,500 a mile. It would seem to be good policy, then, to substitute permanent pavements for those macadam roads as quickly as possible.

Although removal of dead animals is a source of some small revenue to the city, the loss of the animals is a heavy burden on the owners and community at large. During the year, ended August 1, 1913, the contractors removed 9,253 dead horses. If those may be assumed to have been worth \$100 apiece when they died, largely as a result of excessive heat in midsummer and icy and snow covered streets in winter, they represent a loss of nearly one million dollars.

In a section of the report devoted to motor trucks, there is an analysis of the relative cost of hauling by horse drawn vehicle and motor truck or tractor. A table prepared by R. T. Dana, member of the American Society of Civil Engineers, shows savings by self-propelled vehicles ranging from 4 per cent for hauling 2 miles with load, to 14.7 per cent for 10-mile hauls.



The use of dump bodies has increased for bulk loads, the hydraulic type having gained much ground in the past 12 months





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## The Commercial Branch of the Motor Industry

**A**T this period of the year, when everyone interested in motor cars from ocean to ocean and from the northern boundary to the gulf has his interest centered on the show circuit, Motor Age publishes in this issue its annual review of the motor truck industry and takes this opportunity of drawing the attention of its many readers to this growing industry, which industry is unfortunate this year in not having national exhibitions of its own. In this issue the reader will find the truck field analyzed under different heads, all intended to furnish a ready grasp of this industry. The review shows the line of power vehicles that are on the market; the Buyers' Guide gives a ready-reference price classification; the individual review of each concern tells concisely the individual efforts to make progress, or change, call it what you will; and the complete specifications of chassis details mark another year of this useful work by Motor Age.

**D**URING 1913 the motor truck industry made progress, business being relatively good until the middle of the year, at which time many concerns experienced a perceptible falling off in orders and repeat orders, although other companies reported a good season up to the last day of December. The motor truck industry has experienced a consolidation during the past year; in other words, it has made strides towards the inevitable strata it will eventually occupy, while necessarily still far from that position. The past year has seen more than sixty names erased from the motor truck roster and in their place thirty-three or more new names have been enrolled. The three-score that have dropped out have gone the way of the weaklings by divers courses. Some have ended in the courts, others simply closed shop to protect creditors before it became too late, and others wisely decided to abandon the motor truck industry, feeling that its scope was not reconcilable with their business plans.

**A** DIFFERENCE of ninety-three or four names in the motor truck roster of 1914, as compared with 1913, looks herculean, looks as if an earthquake had shattered the industry, and yet, when you analyze the situation, it loses much of the serious aspect. Look first at the thirty-three new names added during the last 12 months and you find not more than two concerns that have been prominent in the passenger car field. The other thirty-one new names generally are companies of small capital and not a few of the new names really are the old trucks being continued under new capital, new companies or new organizations.

**G**LANCE at the more than three-score names that have been dropped from the roster and you do not find more than four or five that have been conspicuous in the passenger car field and in nearly every case you find the concern has followed the law-courts exit route. The other names that are dropped are in many cases concerns of quite local caliber, many of which confess to not making more than five or six trucks a year, and one acknowledges to building but one demonstrator. When so many of these concerns represent but the smallest output, it cannot be disputed that consolidation has been the rule of the year.

**T**HE two or three-score old concerns that have been in the truck industry for several years—the history of many going back to the beginning of the century so far as their existence is concerned and others going back 4 or 5 years—have all been busy. They have not all increased their output; some have, some have reduced it, and others have kept it the same.

**T**HERE are other concerns which realize that their line was too restricted and that one model was not enough to maintain a selling organization. In a word, a 5-ton truck called for a certain selling organization and reached only a restricted field, whereas adding a 2-ton model not only better absorbed the existing field but lessened the selling cost per truck proportionately. This policy has been followed by several of the older and solid companies. Some that have sold but a 1,500-pound vehicle have added a 1½-ton model and others that built but 5-ton and 1-ton types have introduced the 1,500-pound class also. These additions demonstrate that the makers have been very carefully studying the field, that they have discovered the short-comings of their line, that they have discovered the reasons for high selling costs, that they have discovered the reasons for a great many other abuses and their 1914 policy shows that they are in the truck field to stay and that they are also in it on a better and more sound foundation than ever before.

**T**URNING to the progress in design in motor trucks, there is a perceptible advance in the use of worm-driven and inclosed drive types of vehicles. Thirteen concerns now are fitting worm-driven axles, some of these companies using worm-drive on their entire line and others using it on but one or two models. The majority of these worm-driven types are for trucks of 2-ton capacity and under, there only being one concern which builds a 5-ton worm-driven type. Different forms of bevel drive show considerable gain, there being not fewer than thirty-eight concerns outside of those using worm drive using some form of bevel rear axle. As might be expected, the majority of these are vehicles of under 1-ton capacity, there being two or three trucks with 1½-ton capacity only using bevel drive. All told, fifty-one of the 138 companies listed in Motor Age specifications are using what might be designated the inclosed drive, the remainder using chains. These figures are very significant and indicate unmistakably the growing desire for protection in the motor truck, the same as was experienced in the passenger car field. With an increased tendency abroad for inclosed drive, it is a conservative assertion to make that 1915 will witness not a few new companies now using chain drive transferred into the inclosed-drive ranks.

**T**HERE is a continued tendency for truck companies building delivery wagons of capacity from 1,500 pounds to 3,000 pounds to centralize all efforts on a single model, and one or two companies which must be considered among the large truck producers pursue this practice. Where this policy is in vogue the company has designed its vehicle along production lines in order to reduce cost in this way.



# The Seven Ages of SAM

THE circus has its Barnum; grand opera, its Hammerstein—and the dean of all American motor car show promoters and none-greater-than-whom manager of colossal exhibitions of self-propelled vehicles in this country is Samuel A. Miles of Bristol, Me.

Thus a famous declaration of the late Patrick Henry is paraphrased in order to put my narrative into the high speed. I might have started this shrunken biography by veraciously writing. "The success of the majority of the national motor shows held in the United States is measured in Miles," but I am not addicted to the heinous habit of punning. It is enough to state that the life of Samuel A. Miles has been just one motor show after another, for in the last 13 years and 21 days, this recurrent director of gasoline-scented displays has played the role of major domo at seventeen motor shows, thirteen of which made Chicago famous, two redounding to the credit of New York, one causing the residents of Atlanta, Ga., to forsake temporarily their seductive mint juleps and the other being held in connection with the Louisiana Purchase Exposition at St. Louis.

At 2 o'clock on Saturday afternoon—no crowding, please—Miles will ring up the curtain on his eighteenth motor show, a stupendous three-ring attraction to be staged in the Coliseum, the Coliseum Annex and the First Regiment Armory, Chicago. The spotlight will be played constantly on the mechanical stars and the human supes for a week, but not once will it bathe Sam in its blinding rays. He will stand in the wings on the prompt side of the stage, where he can listen to the clicking of the turn-stile, the complaints of temperamental exhibitors, the ballyhoo efforts of the lecturers and the appeals of grafters for passes. He will be about as prominent as a charwoman at an international polo match. Such is the fate of a successful show manager.

## Miles Is An Englishman

Strange as it may seem, the "show me" state, Missouri, cannot lay claim to the proud distinction of being the birthplace of Samuel A. Miles, showman. Blast me, no! Sam is an Englishman, but not without a sense of humor. He was born in Bristol, England—and this is strictly confidential—on May 10, 1862. He was destined to be a promoter. At the age of 15 years, he formed the Clifton Albion Harriers, an athletic club composed of

By J. C. Burton

juvenile cross-country runners. Eddie Carter, sporting editor of the New York Sun, was one of the organization's first members and so well did he develop his wind and endurance in his youth that for 10 years he won the American amateur championships at all distances from 1 to 10 miles inclusive.

## A Journalist at 14 Years

Not realizing that his destiny was in the field of show promotion and management, Miles decided to adopt a precarious means of livelihood and in 1876 joined the army of the unappreciated as reporter on the Bristol Mercury. Sam heard and heeded the call of the sirens of the fourth estate. The click of the type against the compositor's stick, the rattle of the hand press charmed and captivated him. A boy of 14, he dreamed of the day when he would write "his great story," put over "his scoop." But Miles was no ordinary reporter. He was wiser than the average of his ilk. He knew when to quit the game. But I am lapping my narrative.

After covering police court and laying siege to free lunch counters for 4 years, Sam Miles became restless, searched in the atlas for a land of opportunity and turned emigrant, going to New York in 1880. Upon landing he found that he was a persona non grata in the vicinity of Park Row and not qualified as a long-distance faster, so sorrowfully relinquished

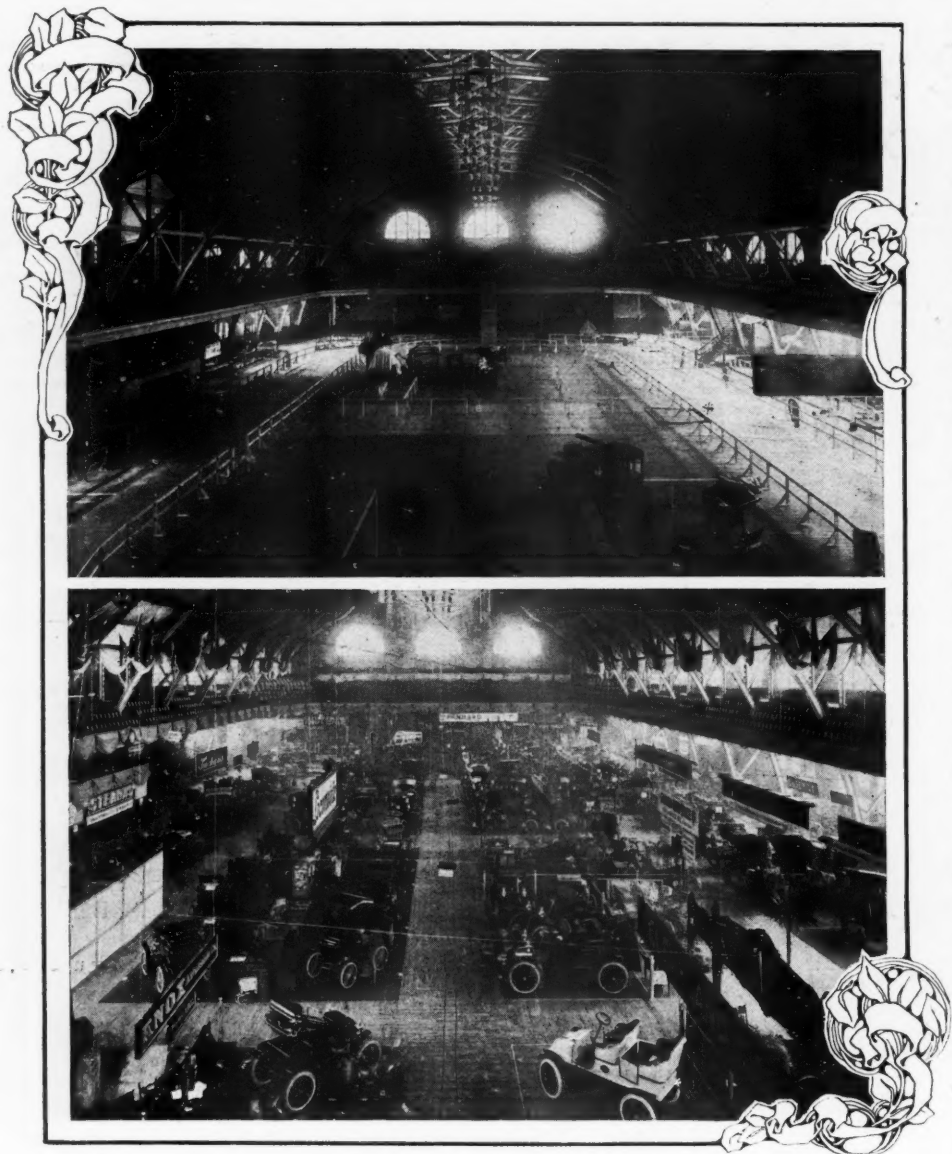
his hold on the journalistic pencil and took up the bank teller's pen. In the banking house where he found employment, he worked on the ledgers with Bob Garden, father of a daughter by the name of Mary, who was to become internationally famous later in the grand opera roles of Carmen and Thais. Sitting on high stools and daily taking the pulse of Mammon, Miles and Garden formed a friendship in New York that was renewed in Chicago when in after years both followed Horace Greeley's advice.

## Strives for Athletic Laurels

Knowing that all work and no play might make Sam a dyspeptic, Miles first affiliated with the Pastime Athletic Club and later with the Manhattan Athletic Club and wore the colors of these organizations on the eastern athletic tracks where he competed against such stars as W. G. George of England, present holder of the 1-mile running record of 4:12¾. Miles modestly admits that although never ranked as a crack, he was a glutton for







THE COLISEUM IN 1901 AND 1905

The two illustrations shown above are historic. The upper one shows the building at the time of the first show in 1901, when eighteen vehicles were displayed. Miles had so much room that a beard track was laid and exhibitors were permitted to give demonstrations in the building. Then it was not a question of anything but whether the car would run at all. The photograph was taken just as the exhibits were being moved in. The other illustration is that of the show of 1905. Note that the Locomobile is displaying a steamer. It also is interesting to note the single-cylinder Cadillac, while the Knox is a curiosity

punishment and ran all the distances from  $\frac{1}{2}$  a mile to 10 miles.

#### Hears Call of the West

Just as Tammany was about to regard him as a prospective voter, Miles heard the call of the west and migrated to Chicago in 1883. Journalism again flirted with him and found him a willing suitor. C. C. Corbett, publisher of the Sporting and Theatrical Journal, had a fit of extravagance one day and hired Miles at a weekly salary of \$3 to contribute five pages of athletic news to the impoverished publication. Two years later, Corbett sold out to his partner, F. B. (Yank) Adams, and Miles was made editor of the Sporting and Theatrical Journal at the tender age of 23 years. Sam, wishing to add to the

obesity and brilliance of his editorial staff, first hired the late Hugh E. Keough, the immortal, the caustic HEK of Chicago Tribune fame, and then Lou Houseman, the veteran pugilistic critic. In addition to his duties as editor, Miles also contributed sporting articles to the Chicago Inter-Ocean, the Chicago Times, the Chicago Herald and the Chicago Daily News, then written, printed and published by Melville E. Stone and Victor Lawson in an unostentatious building on Madison street near Fifth avenue. He also wrote weekly letters for the Pittsburgh Leader, the Cincinnati Commercial Telegraph and the St. Paul Pioneer-Press. Occasionally he was called into a sonorous woodshed conference at the rear of his boarding house on West

Adams street by the father of Finley Peter Dunne and held the recalcitrant, squirming "Mister Dooley" while a stern parent did something with a bed slat that "hurts me far more than it does you, my son."

Had he not been so tender-hearted, Miles would have blossomed out as a partner of Hughie Keough in the publishing business in 1887. Parson Davis, immortally famous as the manager of John L. Sullivan; Mike McDonald, political boss of Chicago when the Carter Harrisons first secured a perpetual lien on the mayoralty; and A. S. Trude, a Chicago attorney, volunteered to finance a paper that was to be printed in opposition to the Sporting and Theatrical Journal. Yank Adams feared a rival publication, especially one on which Miles and Keough were collaborators, and flooded his tear ducts so successfully that his two ambitious employees promised not to desert him.

#### Handicaps Pullman Road Race

In 1887 Bob Garden came to Chicago as manager of the Chicago branch of the Pope Mfg. Co., and the following year started the Pullman road race, the cycle classic of decades gone by which has been perpetuated to this day by the grand-children of the original competitors. He made Miles official handicapper. Sam was not a novice at this job for he was serving as handicapper for the Wanderers Athletic Club, the Union Athletic Club, the Chicago Athletic Club and fifteen other similar organizations that flourished and made athletic history in the windy porktopolis over a score of years ago.

Sam Miles rode to his ultimate destiny on pneumatic tires. He made his debut as a showman back in the almost forgotten era of bloomers, when the veteran motorists of the present were turning centuries over the country roads and dreamed not of a vehicle that soon would liberate them from the task of pedalling, when "A Bicycle Built For Two" was a musical forerunner to the cabaret classic of today, "He Had to Get Under, Get Out and Get Under to Crank Up His Automobile."

Miles started the Referee, a paper devoted to cycling news, and organized his first bicycle show and race meet, which was held in the old Exposition building on the lake front, in 1888. Among the amateurs who competed in the speed events were, N. H. VanSicklen, H. R. Winship, Eddie Bode, J. P. Bliss, Howard Tuttle and Arthur Lumsden, now European manager for the Goodrich Tire and Rubber Co., and the entry lists for the professional events contained the names of Jack Prince, Ralph Temple, W. M. Woodside, Senator Morgan and Harry Higham.

#### Bicycle Show Continued Success

Although not a pretentious exhibition, Sam's first show was such a success that it was repeated in 1889. The following year, 1890, the Exposition building was abandoned because it was too small to accommodate the large number of exhibits and Miles hired the First Regiment



Armory and Battery D. for the first bicycle show in Chicago that was justly entitled to all the superlatives of which the circus press agent is so fond. The show of 1890 was colossal, stupendous, awe-inspiring and the rest of it. So were the shows of the next 5 years. Miles was a showman extraordinary. He had secured a strangle-hold on his destiny and was slowly pinning its shoulders to the mat when the cycling craze gradually started to subside and Miles put the silk hat and fur-collared coat of the impresario into cold storage and donned again the sack-cloth and ashes of the journalist.

#### Publishes Referee in Europe

Sam Miles believed in expansion in the journalistic field and returned to England in 1897 to organize a European edition of the Referee which was published from the London office in English, French and German. In 1898 he came to America to amalgamate the Referee with N. H. Van-Sicklen's Bearings and Cycling Life, owned by Walter Wardrop. The paper was christened Cycle Age and was so published for 2 years when the name was changed to Motor Age.

Even while he was in Europe, Miles heard the purring of an engine that was soon to revolutionize the transportation methods of the world. He was told that Charles Duryea was building a self-propelled vehicle at Asbury Park and assigned John Wetmore, present motor editor of the New York Mail, to write a one-page description of this embryo horseless carriage for Cycle Age, three or four pages of which were devoted to motoring news, the greater bulk of which was prophecy and speculation.

#### Plans Debut for Motor Car

Sam Miles' unbounded faith in the motor car was soon to be justified however. There was born a crude, shapeless, balky, complicated and noisy machine that arrogantly snorted defiance at horses and then suddenly subsided while its disgusted operator bargained with a grinning team owner for a "pull." Here was a new "star" for Sam Miles' "starless" show. He determined to exploit it, to assist the struggling maker to create a demand for it. Comic artists might cartoon it, urchins jeer at it, skeptics stamp it as impracticable, but Sam Miles was sanely visionary and believed in this temperamental gasoline buggy, anticipated the taming of this seemingly untameable mechanical shrew and planned a coming-out party for it.

He selected Chicago for his newest, his wildest venture. He rented the largest building in the city, the Coliseum which was then in the course of erection, as the stage on which his new star should make its triumphant premiere. The Coliseum is an edifice with a history. Here Diavolo and the G. O. P. have looped the loop; under its massive girders Bathhouse John, Alice Roosevelt and Elihu Root have sat to receive the applause of admiring thousands; within its four massive walls presi-



MADISON SQUARE GARDEN AND THE 1900 SHOW

Fully as interesting as the Chicago show pictures on the preceding page are the two illustrations shown herewith—the first New York show. As was the case at Chicago, there was so much room that it was possible for a demonstrating track to be laid. Here many New Yorkers had their first motor car ride. To prove that the new vehicles could climb, a board hill was built on the roof of the Garden. As may be seen by the lower illustration this was quite a steep incline. The novelty of the idea appealed to the public and the hill will go down into history as the great feature of the first motor car exhibition in New York. The show itself was a most interesting one

dents have been nominated and wrestling champions introduced, but first of all, it was the cradle of Chicago's motor car shows. Before a ringmaster's whip cracked, before the gavel of a national convention chairman rapped for order, before the bell that sent two gladiators to the center of the ring clanged, a motor car sounded the dedicatory note, a feeble, timid stutter. For Sam Miles opened the Coliseum with Chicago's first exhibition of self-propelled vehicles and a strange and lean exhibition it was.

#### First Show in March, 1901

It was in March, 1901 that Sam Miles made his bow as a motor car showman. Fashion had not yet decreed that the tonneau should button up the back. Makers

were so busy solving problems of suspension and carburetion that they had no time to think of concealed door hinges and clean running boards. The exhibits were as novel as the exhibition of which they were a part. Machines were begged, stolen and borrowed until Miles corralled eighteen models of self-propelled vehicles and some two dozen accessories. There was so much unfilled space that an 18-foot track was built around the Coliseum. This served two purposes, it filled up a void and gave proud owners an opportunity to show skeptics that their horseless carriages could run.

The freak of the 1901 show was a two-wheeled electric vehicle with a heavy battery suspended on the axle to counter-



balance the weight of the passengers. The operator steered the self-propelled jinrikisha by stopping one wheel and turning the other in the direction he wished to go.

Originally it was Miles' aim to hold the Chicago show simultaneously with the New York exhibition, which took place in November, 1900, but the roof of the Coliseum fell while the building was being constructed and made a postponement of the Chicago show necessary.

To be veracious, it cannot be said that Sam Miles cleaned up a fortune on his first motor car show. The gate receipts for the week totaled \$3,200. The house was "papered" every night to give a semblance of enthusiasm. With the exception of a few enthusiasts, everyone that paid to get in did so reluctantly and with fingers crossed. Every day was Missouri Day. The spectators were there to "be shown."

It was the opening night of Chicago's first show that Sam Miles qualified as a prophet. With Senator Morgan, he went up to the balcony of the Coliseum and

looking down upon the scattered exhibits, declared:

"The day is coming when we'll fill this building with cars."

That prophecy was fulfilled the following year. There was such a demand for space at the show of 1902, such a plethora of exhibits compared to the paucity of cars the year before, that Miles leased the Coliseum Annex in which to display the overflow. At least fifty machines and between fifty and sixty accessories were exhibited and the paid admissions totaled \$8,930. The success of the 1902 exhibition showed the wonderful strides made by the industry and the astounding increase in public interest inside of 12 months.

In 1903 the National Association of Automobile Manufacturers joined Miles in promoting the Chicago show and made him the general manager of the organization. The history of the Chicago motor shows is a story of continual growth. In 1905 it became necessary to hire the First Regiment Armory in addition to the Coliseum and the Coliseum Annex so great was the

demand for exhibition space. Except in 1907, a year of panic when the attendance fell off about 10 per cent, the Chicago show never has gone backward. It is a splendid tribute to the man who conceived it, the man who believed in the future of the motor car and was not afraid to back such a belief with his money and energy.

Same Miles, athletic, journalist, publisher, founder of the Chicago show, show director and general manager of the National Automobile Chamber of Commerce, has another title. He is president of the Bideford Amateur Athletic Club of Bideford, Eng., a historic town where Sir Walter Raleigh, the gallant, and Charles Kingsley, the author, once made their home. Several members of the Clifton Albion Harriers reside there and it was their children and grand-children that launched Miles' boom for president of the Bideford Amateur Athletic Club 4 years ago when he visited England and gave a trophy to be competed for by the club members.

Such are the seven strenuous ages of Sam to date.

## Setting the Stage for Chicago's Fourteenth Show

### Coliseum and Armory Ready for Exhibitors

CHICAGO, Jan. 19—The fourteenth annual Chicago show, which opens next Saturday afternoon, promises to live up to its reputation as being the greatest business show of the country, for this great middle west is a market that is the very backbone of the motor industry.

Samuel A. Miles, director-general of affairs, came to town this week and assumed command, and today the two big buildings are almost ready for the exhibitors. The decorations are nearly complete and it looks now as if this show would be the best-looking one Miles ever put on. In general this idea is that of a conservatory, a grass roof having been put on.

#### Total of 276 Exhibitors

The count today shows that there will be a total of 276 exhibitors in the show, of which number eighty-seven are car manufacturers. Numerically speaking, this is not as large as the New York show which had eighty-three car makers and 266 exhibitors of accessories. But Miles could not squeeze any more into the three buildings, the Coliseum, Annex and Armory, although he has a long waiting list.

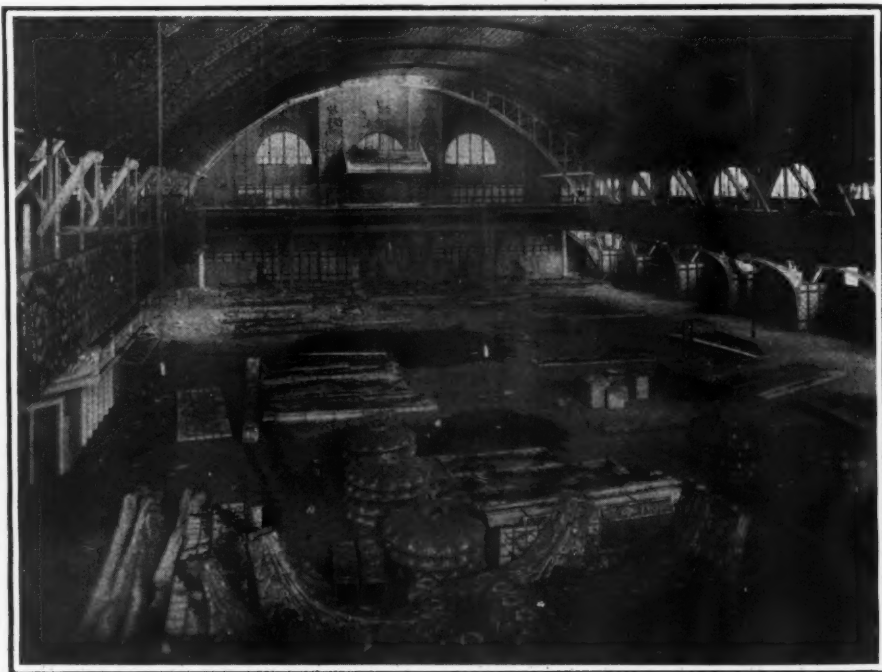
Manager Miles and Clyde Warner, promoter of the cyclecar show in the old Wilson building, now known as the Greer building, have got together, with the result that the interests of the two have been merged so far as the Greer building is concerned. An entrance with the Coliseum Annex will be opened and Miles will move some of the passenger car exhibits from the basement to the Greer building, putting some of the cyclecar concerns into the space vacated by the larger cars.

Chicago will have more different makes of cars on display than New York, but there will not be so many as in previous years, the count being eighty-seven for Chicago and eighty-three for New York. This is accounted for by the refusal of some of the makers to accept space in the basement of the Coliseum annex. This space, however, was eagerly grabbed by the accessory people.

There are fifteen makes of cars showing at Chicago which were not at New

York, while the latter had eleven makes which will not be in the Coliseum show. New York's extras however, all were gasoline cars, while six of Chicago's surplus fifteen are electrics. Those in Chicago and not in New York are: Argo electric, American cyclecar, Borland electric, Broc electric, Lambert, Chicago electric, Crow, Lexington-Howard, Marathon, Pilot, Westcott, Woods electric, Stickney cyclecar and McFarlan.

New York's eleven not showing at Chi-



AS THE COLISEUM LOOKED LAST MONDAY



cago are: Briggs-Detroit, Briscoe, Cameron, Cornelian cyclecar, Empire, Fisher, Kline, Michell-Lewis, Twombly, Vaughan and Ward.

The makes of cars booked for Chicago are: Abbott-Detroit, Allen, Detroit electric, Apperson, Argo electric, Auburn, American cyclecar, Baker electric, Borland, electric, Lambert, Buick, Cadillac, Cartercar, Case, Chalmers, Chandler, Chicago electric, Cole, Crow, Davis, Fiat, Franklin, Garford, Great Western, Haynes, Henderson, Herreshoff, Howard, Hudson, Hupmobile, Imperial, Jackson, Jeffery, Keeton, King, Kissel, Krit, Lexington, Locomobile, Lomax, Lozier, Lyons-Atlas, Marion, Marathon, Marmon, Maxwell, McFarlan, McIntyre, Mercer, Metz, Mitchell, Moline, Moon, National, Oakland, Ohio, Oldsmobile, Packard, Paige-Detroit, Partin-Palmer, Pathfinder, Peerless, Pierce-Arrow, Pilot, Pope-Hartford, Premier, Rauch & Lang electric, Regal, Reo, Speedwell, Standard electric, Stearns, Stevens-Duryea, Stickney cyclecar, Studebaker, Stutz, Velie, Vulcan, Waverley electric, Wescott, White, Willys-Knight, Winton, Woods electric.

In contrast to New York, there will not be so many meetings. The executive committee of the National Automobile Chamber of Commerce will hold its monthly meeting in the Armory, Wednesday, January 28, while the dinner of the Exide battery people will be held the same night at the Mid-Day Club. The Illinois Garage Owners' Association also will have a 2-day session at the Lexington, January 27 and 28, winding up with a banquet. More than 100 dealers will attend.

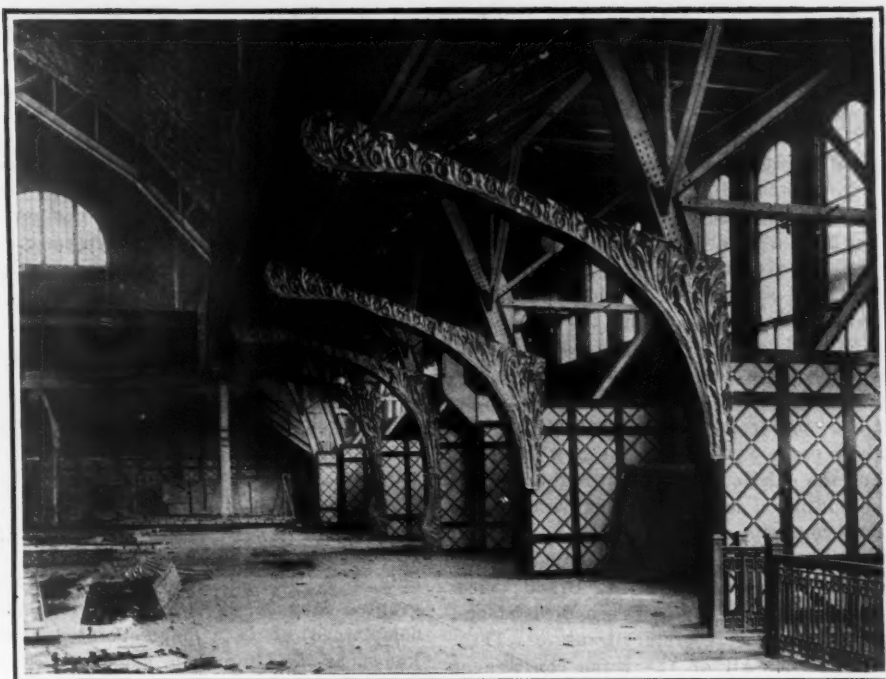
#### Herff-Brook Prepares Surprise

The Herff-Brook Corp., of Indianapolis today announced a surprise for the Chicago show, where it will display for the first time the Herff-Brook car, made in two models, a four and a six. Heretofore the company has confined itself to marketing the Marathon car, but now it has decided to make cars also.

The new Herff-Brook six-cylinder will list at \$1,375 and the four at \$1,000, both fitted with electrical starters, the Jesco, without extra cost. The six motor is 4 by 4½ and the four 4½ by 5. The six wheelbase is 124 inches and the four 116, while the six will weigh 3,300 pounds. The new cars will be made in the old Wayne plant at Richmond, Ind., and will come as five-passenger touring cars and two-passenger roadsters.

Not being able to get in the Chicago show, the Empire will be exhibited at the Ralph Temple Automobile Co., 1219 Michigan avenue, while the Coliseum affair is in progress.

The Knight interests will hold their meeting on Wednesday of show week and there will be present the engineers and producing experts from the Moline, Willys, Lyons, Stearns, Maxwell and Russell companies, as well as Charles Y. Knight, L. B. Kilbourne, E. C. Lonas and Owen Thomas.



DECORATIONS UNDER CHICAGO COLISEUM BALCONY

## New Rubber Found in the Fiji Islands

### Bulia Tree Promises to Be a Factor

SUVA, Fiji Islands, Jan. 5.—Covering the greater portion of the 250 islands that comprise the Fiji group is a jungle of tropical vegetation. The total area of the islands is 7,435 square miles. Of the great variety of wild trees and shrubs which are found in the uncultivated portions, some of which are already a source of profit, none is believed to have greater commercial possibilities than the bulia tree. Its trunk, branches and leaves contain the largest percentage of raw rubber of any known source of supply of that product.

Steps now are being taken to exploit the bulia on a big scale for its rubber properties. The fact that the fluid cannot be obtained from it by the ordinary method of scarifying has heretofore prevented the production of the product. It is now claimed, however, that it is possible and practicable to extract the rubber from the bulia by crushing and the application of the same methods to it that are followed in obtaining rubber from the guayule shrub in Mexico.

It is predicted that in a few years Fiji will take important rank as a producer of rubber from this tree. Instead of utilizing the tree as it is found in its native state it is proposed to propagate it by means of slips and to plant a large area of them. Experiments show that the tree easily obtains a commercial size within 12 months after planting. It is proposed to cut the trees when young, say at least once a year. If the tests that have been made with the wild trees work out the same with the cultivated, or rather with the planted ones, as

it is not necessary to cultivate them, 1 acre of trees should give a yield of at least 1 ton of raw rubber. From the standpoint of production nothing equal to it or anywhere near equal is known. The percentage of rubber is so high that one can obtain a good sized ball of it in a few minutes simply by crushing and rolling the leaves between the hands.

Men who are well known as experts in the production of Para rubber say the bulia is one of the great marvels of nature. There are a few Para rubber tree plantations in Fiji. Most of the trees were planted within the last few years and are not in bearing or state of production. It is stated by the owners of these young rubber plantations that the soil and climate of these islands are splendidly adapted for the industry of growing rubber and that irrespective of what is the outcome of the movement to utilize the bulia on a large scale, Fiji will soon enter the list of countries that have large outputs of Para rubber.

#### SELLING SANDUSKY ASSETS

Sandusky, O., Jan. 19—Edward S. Stephens, receiver for the Sandusky Auto Parts and Motor Truck Co., is selling out the remaining properties of the concern which was some time ago adjudged bankrupt. The property consists of 11 acres of land along Sandusky bay, two buildings worth \$50,580, machinery and tools worth \$23,393 and personal properties worth \$43,253. The real estate is valued at \$8,250.



# Argo, Borland and Broc Electrics in Big Merger

## American Electric Car Co., \$1,500,000 Concern, Result of Consolidation

CHICAGO, Jan. 21—A new influence is injected into the electric car situation by the formation of the American Electric Car Co., a \$1,500,000 corporation, the result of a merger of the Argo Electric Vehicle Co., Saginaw, Mich., the Borland-Grannis Co., Chicago, and the Broc Electric Vehicle Co., Cleveland, O., the final details of which were perfected today. The three makes of cars manufactured by these concerns will be marketed under their present names by the new company and the existing agencies undoubtedly will be continued in their present form by the new concern.

The officers of the American Electric Car Co. are: President, F. A. Brand; vice-presidents, Fred Buck, Bruce Borland and U. B. Grannis; secretary-treasurer, Theodore Huss. All of the three constituent companies of the new organization are represented on the executive board and on the board of directors.

The strength of the new organization may be judged by the fact that the assets of the three companies taken over are held as an encumbrance by the American Electric Car Co., and in addition a large amount of new capital has been acquired, it is stated, enabling the company to further extend the business heretofore carried out by the separate institutions.

According to one of the officers of the new corporation, a great saving in manufacturing and material costs is expected on account of the large production assured the organization. The machinery and general manufacturing equipments of each of these distinct plants are of the best. In addition to the reduction in overhead expenses, selling costs will be reduced, it is believed, on account of the distribution of the product through one marketing organization.

In these times of dark rumors and uncalled for statements of the stability and lack of confidence in the motor car industry, it is a refreshing stimulant to the trade to find that capital is ready to invest in an organization of this magnitude, planned on sane and considerate lines. This is the opinion of those familiar with the situation. This consolidation of these three companies is a move that is commendable from the sound business point of view and it is an evidence that proper and conservative consideration is being given by the motor car manufacturers to the efficient conduct of their business, according to those familiar with the industry.

The new organization is fortunate in having all three makes of its 1914 models perfected and ready to market. These include three Argo models, six Borland models, and the same number of Broc models, all of the above being pleasure

vehicles. In addition to these, the Argo commercial car will be marketed. The aggregate business of the three companies of the new consolidation will make it one of the largest manufacturers of electric cars, it is stated.

### KLAXON SUES LONG HORN PEOPLE

New York, Jan. 20—Suit for an accounting, damages and an injunction has been filed in the federal court, southern district of New York, by the Lovell-McConnell Mfg. Co., Newark, N. J., against the H. W. Johns-Manville Co., New York city, for infringement of the Klaxon basic patents Nos. 923,048, 923,049 and 923,122, granted May 25, 1909. The infringement complained of is a hand-operated horn, known as the Long horn, made by G. Piel & Co., Long Island City, and marketed by the H. W. Johns-Manville Co., this city.

The patents sued on are the ones which Judge Chatfield sustained in an elaborate opinion recently handed down in the Brooklyn suit against the Newtowne horn. In the present suit against the Long horn, the bill of complaint recites this favorable decision of the Brooklyn court as one of the grounds for granting the preliminary and permanent injunctions prayed for in the bill.

This is the first suit brought against a hand-operated horn, since the recent decision. This not only includes motor-actuated horns, but also hand-operated ones.

The suit against the Newtowne, which was filed March 30, 1911, was generally considered a test case, the outcome of which naturally will affect the other suits against the following concerns: The Sparks-Withington Co., Jackson, Mich., the Square Horn Mfg. Co., this city, and about four different suits in Michigan. Many other suits, against jobbers and dealers who handled Newtowne horns also were instituted. This also included dealers who sold cars equipped with these horns.

The temporary restraining order issued January 14 to the Johns-Manville company preventing Lovell-McConnell from interfering with the former's advertising contracts, etc., was dissolved by Judge Ward yesterday. The Johns-Manville company states it is going to carry the matter to the United States circuit court of appeals.

### K-W FIGHTS IMITATION GOODS

Cleveland, O., Jan. 19—The K-W Ignition Co. announced today that it has filed suit in the common pleas court of Cuyahoga county against the M. and M. Co. of this city for \$10,000 damages. An injunction was secured, restraining the defendant from offering and selling imitation

springs and contact points as K-W's.

"Several other cases have been called to our attention where people ask for K-W master vibrator springs and contact points and are furnished with imitation, which are not made right and will not work satisfactorily on the K-W master vibrator," says the K-W company. "The same also applies to K-W spark coils. We have had a few coils returned to us as defective and the only defect was the use of these imitation points which did not work.

"As this practice injures the standing of our goods, we brought suit accordingly against one of these concerns—namely the M. and M. Co. of Cleveland. In this case no attempt was made to explain that the goods offered as K-W were not genuine K-W, but on the contrary they were spoken of as K-W springs and contact points and the bills made out accordingly."

### PITTSFIELD PLUG IN PATENT SUIT

New York, Jan. 20—William Barber and Emil Grossman have brought suit in the United States district court for the southern district of New York, against the Western Electric Co., this city, for an alleged infringement on their patent No. 723,032, granted to William Barber, Brooklyn, N. Y., for a spark plug with an insulator consisting of a combination of porcelain and a less fragile substance. Grossman recently bought a fifth interest in the patent, the Red Head plug, which he manufactures, thereby ceasing to be an infringer. The complainants claim that the Pittsfield plug, made by the Western Electric Co., was offered for sale at the recent show, and ask for \$10,000 damages.

### U. S. TIRE WINS NOBBY DECISION

Indianapolis, Ind., Jan. 20—The United States Tire Co. has scored its second victory in the patent infringement suit brought by the Republic Rubber Co., of Youngstown, O., which claimed that the Nobby Tread tire, made by the G & J factory of the United States Tire Co. was an infringement of the Mell patent, No. 898,907, of which the complainant is owner. The most recent decision takes the form of the dismissal of an appeal from a lower court that held the patent invalid. The suit has been in the courts since December, 1911, when the Republic Rubber Co. secured in the New York courts a favorable verdict which was later reversed.

The latest decision in part reads as follows:

"In the circuit court of appeals of the second circuit it was held that the patent was void for lack of invention in view of the prior art and the nature of the alleged improvement. In the record before us the



new thing is said to be the testimony which bears upon the high degree of usefulness of the Mell tire and also the great commercial success that has been achieved in its manufacture and sale. Matters of this kind can only be used to resolve a doubt in favor of the patentee when the court has been left in doubt after a full consideration of the nature and scope of the patent and a comparison thereof with the teachings and structures of the prior art. Utility of the device and the commercial success used in exploiting it cannot be used to resolve the doubt as well as to create it, else every useful and successful thing would be patentable."

#### TRUCK CLUB DISCUSSES TIRES

New York, Jan. 21—The regular monthly meeting of the Motor Truck Club was held this evening at the new building of the Locomobile Co., of America. The subject was "the Relation of Motor Tires to the Cost of Maintaining Motor Trucks," and the speaker of the evening was S. V. Norton, truck tire sales manager of the B. F. Goodrich Co., Akron, O. His address covered the entire construction of a tire from the trees of the tropical jungle to the completed tire on the truck and even went further, treating many of the problems of use and abuse of truck tires. All were illustrated with stereopticon.

#### WAVERLEY REPORTS BIG BUSINESS

Indianapolis, Ind., Jan. 16—At the annual meeting of stockholders of the Waverley Co. it was shown that the company enjoyed a prosperous business during the last year. The business for the year reached \$1,312,815.94, and \$441,336.64 was spent for salaries and wages. The company's surplus and undivided profits now amounts to \$590,000, although the capitalization is but \$190,000. The directors and officers were elected as follows: President, W. B. Cooley; vice-president, H. H. Rice; secretary, W. C. Johnson; treasurer, William Kothe; directors, Hugh Daugherty, J. C. Schaf, A. C. Ayres and H. M. Love.

#### HERRESHOFF SIX PRICE CUT

Detroit, Mich., Jan. 19—The Herreshoff Motor Co announces material reductions in the prices of its six-cylinder models to take effect at once. The roadster, six-passenger and five-passenger cars fitted to the six-cylinder chassis which formerly have been listed at \$1,850 are henceforth to be sold at \$1,600, while the seven-passenger model is reduced from \$1,900 to \$1,650. The four-cylinder models have not been reduced. To take care of the greater demand due to this lower figure, Mr. Herreshoff states that the production of the sixes will be increased fourfold.

#### NEW YORK IN "SAFETY FIRST" FIGHT

New York, Jan. 20—The Safety First Society was organized last night at the Hotel Astor. Its object is to make the

streets, transportation lines, and buildings of the city as safe as scientific knowledge, adequate laws, and the greatest care can make them. To obtain this result, the organization proposes to consolidate and extend the present unrelated activities of civic organization, motor clubs and associations, public service corporations, and insurance companies, and to conduct a vigorous publicity campaign to impress upon all users of public streets and places their duties with respect to public safety.

The board of trustees, which was elected last night at the meeting, included a few prominent motor car people such as: Robert Lee Morrell, C. A. Stewart, Jefferson de Mont Thompson, and A. B. Cumner.

A meeting of the trustees will be held at the earliest possible date for the election of officers and the appointment of an executive committee. F. H. Elliott will act as secretary, with offices at the Hotel Astor, until organization is completed.

#### GURNEY COMPANY ELECTION

Jamestown, N. Y., Jan. 20—At the annual meeting of the Gurney Ball Bearing Co. held in this city today the following directors were elected by the stockholders: William T. Falconer, Alfred E. Hall, Henry K. Smith, E. Snell Hall, Frederick

W. Gurney, Fred J. Galloway and Arthur W. Kettle. This constitutes the entire board, which is to serve for 1 year. At the directors' meeting later the following officers were elected: President, William T. Falconer; vice-president, Henry K. Smith; secretary, Arthur W. Kettle; treasurer and general manager, S. F. Inzer Baker. The most important developments of the entire meeting, aside from the general reports of satisfaction, was the fact that notwithstanding existing conditions the company had shown a marked increase in gross business over the previous year, with every indication of far outstripping the 1913 record the coming year. It was definitely decided to add additional machine equipment to care for the assured increase.

#### TO SELL NYBERG PLANT

Indianapolis, Ind., Jan. 19—Plans for taking over the plant and business of the Nyberg Automobile Co., at Anderson, Ind., have been abandoned by Henry Nyberg and C. H. Henderson, who was sales manager of the company. The receiver for the company will proceed to sell the plant at the best figure possible. Nyberg and Henderson found it impossible to finance their plan. Henderson will locate in Indianapolis.

## Hoosiers Talk on Electrical Matters

Indiana S. A. E. Meets at Esterline Plant

By Darwin S. Hatch

INDIANAPOLIS, Ind., Jan. 20—Announcement and demonstration of an instrument which records graphically the current required at all times in every portion of the electrical cranking, lighting, ignition, gearshifting and horn systems was the feature of the January meeting of the Indiana section of the Society of Automobile Engineers this evening. The Hoosier engineers were the guests of the Esterline Co. and the meeting was held in the demonstration room of the Esterline company's plant.

George W. Weidley, of the Premier company, acted as chairman, introducing C. E. Hansell, assistant manager of the Esterline Co., whose subject was "Curve Drawing Instruments and Their Industrial Applications," and J. W. Esterline, president and general manager of the company, who talked on the subject, "Electrical Tests of the Motor Car." The first paper described the new electrical curve drawing instrument and discussed its general application while the latter one described its practical use in the testing of motor cars.

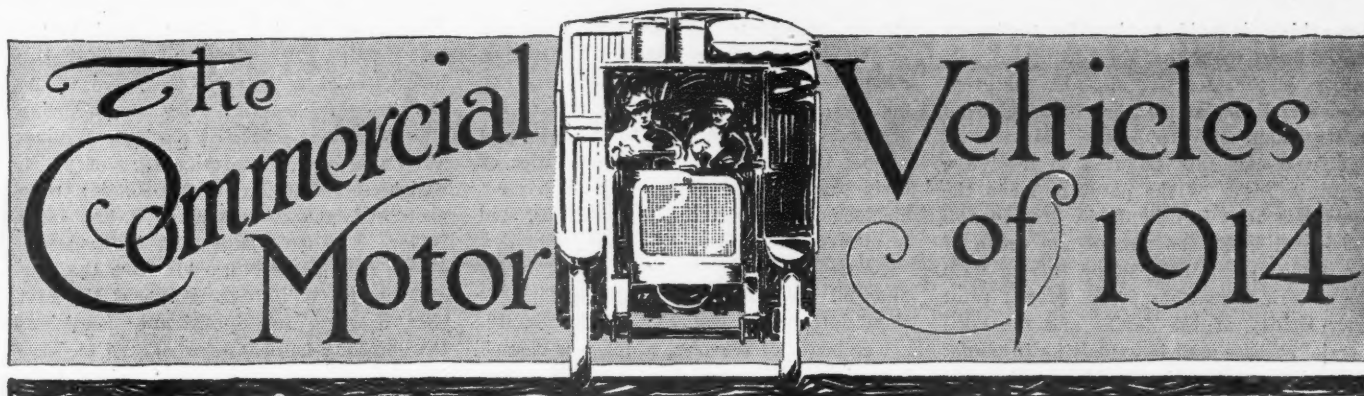
The instrument under discussion is the latest product of the Esterline Co. and has its widest application to the testing of motor cars in the form of an automatic recording ammeter. As brought out by Mr.

Esterline's paper, it gives a permanent record of the current required at each instant by the starting motor to turn an engine over and shows any hidden defects in the electrical system. The curves produced automatically are subject to analysis which may bring to light any differences in compression, friction and so forth, in the cylinders.

A feature that excited most interest among the fifty engineers present was the graphic way in which differences in compression on different cylinders of the same engine were shown up under test, by the variations in current required to overcome the compression. The meeting concluded with an actual test of a motor performed in the demonstration room, in which a certain abnormality in the test curve showed up a slight error in valve adjustment and pointed to the valve at fault. When this misadjustment had been remedied the record indicated the improvement.

Chief among the offices of the new instrument, according to Mr. Esterline, is the final test of the engine and electrical equipment before the car is delivered and which requires no more than 5 minutes. A full report of the papers presented and the discussion thereon will appear in Motor Age next week.





## Review of Changes in Trucks and Delivery Models

Trend Shows Increase in Popularity of Worm Drive—Four-Wheel Drive Makes Big Gain—Side-Chain Drive Type Still in Majority—Single-Chassis Idea Takes Well with Manufacturers

### ADAMS

*Three chassis in medium-sized class*

ADAMS trucks range in capacity from 1 to 2 tons and are made in three chassis models. They are made by the Adams Bros. Co., Findlay, O. Their principal departures from the orthodox are in the form of hood and radiator location, patterned after the French with the radiator on the dash, protected by a sloping hood. The employment of left drive can hardly be called a novelty. These vehicles are conservatively produced in moderate numbers, on the series plan instead of in yearly models. The parts which go into their make-up are mainly manufactured in the Adams plant.

Model A is the smallest vehicle, having a capacity of 1 ton, model D is of 1½ tons capacity, model E of 2 tons and model F, also of 2 tons capacity, a new addition to the line, brought out early in the summer of 1913, is similar to model E except in its wheelbase, which is shorter than that of model E, and in its equipment of a special dumping body permanently attached to the chassis. This model has a wheelbase of 115 inches, instead of 140 inches as on the parent model. This shortened length is used because the new model was designed for loads of great density such as sand, coal, gravel, etc.

The other models are identical with last year's production. It has been found that the vehicle having the greatest market is the 1-tonner. The increased production due to the greater demand has made it possible to reduce the price on this model for 1914 from \$2,100 to \$1,850.

The radiator on the dash is of the vertical tube type. It is fitted with fillers on either side, greatly facilitating refilling. Circulation of air is maintained by a fan-vaned flywheel which also draws the air from the hood. The hood is hinged on its rear upper edge, so that it may be raised to clear the entire engine. No governor is fitted.

On the 1 and 1½-ton models two wheelbase options are offered, 121 or 136 inches respectively, on either model. Model E has a wheelbase of 140 inches and Model F 115 inches. From the motor the drive is taken by a dry-disk clutch faced with raybestos. From this, the motive power is transmitted through a shaft by the gearset, which is of the selective three-speed pattern mounted as a unit with the jackshaft. Final drive is through exposed chains. The foot brakes are mounted

on the jackshaft, within the frame, and the hand brakes are internal expanding in the rear wheels.

Single ignition is used, the Elsemann magneto being placed at the extreme front of the engine where it is farthest from the radiator, and most accessible. It is driven by a transverse worm-driven shaft which also drives the centrifugal water pump.

### AMERICAN

*One-ton truck a 1914 product*

THE American 1-ton truck, made by the American Motor Truck Co., Detroit, Mich., is purely a 1914 machine. It represents the designers' idea of standard practice at the present time. It is built up of various standard parts, such as a Continental unit power plant, including a dry-disk clutch and a Brown-Lipe selective three-speed gearset. From the gearset the drive is taken by a shaft with two universals to a double-reduction live axle of Weston-Mott manufacture.

The motor is located under a straight-line hood with the radiator in front. Back of a steel dash is a steel seat and floor integral with the dash. The truck is controlled by a steering wheel on the left side, a hand and foot throttle, and center levers mounted directly on the cover of the gearbox.

Ignition is on the single plan, by means of a high-tension magneto, the advance of which is fixed. A Kramer governor is fitted to the motor. Pressed steel in channel section is used in the frame, a single wheelbase of 132 inches being offered. Wood wheels with solid tires are the only standard equipment. All brakes are located in the rear wheels.

A special feature of the new truck is a recording instrument which will be furnished on the manufacturer's strong recommendation. This instrument is a speedometer, odometer, clock and service recorder combined, sealed in a case so that tampering with it is not possible.

### ARMLEDER

*Three-ton truck a new one*

THE O. Armleder Co., Cincinnati, O., has added a 3-tonner. This addition expands the line so that it now ranges from 1 to 3 tons, comprising four models. The friction-driven 1500-pounder which it formerly produced is not continued, except as a special job, for this year.

On the 1 and 2 ton models option of pneu-

matic or solid tires is offered. For high-speed work pneumatics are recommended. Left steer and center control have always been used on Armleder vehicles. Pressed steel frames are employed on all models as standard equipment. In some cases, however, channel-iron frames are used where special chassis construction is demanded. Although governors have not been used heretofore, owing to dissatisfaction with the present type of motor-gear device, a new type is to be tried on the worm-driven 3-tonner. This governor will govern not the motor speed, but instead the speed of the vehicle.

Refinements that have been made on all models are: a larger fan which because of its greater capacity may be operated to give the same output with less belt tension and bearing wear; grease cups instead of oilers on the rear spring bolts to enhance the convenience of oiling operations; a larger grease cup on the front end of the radius rod because it has been found that large grease cups receive the most attention; nickel alloy steel in the front axle instead of carbon steel; detachable chains on the chain-driven models because when chains are to be removed it is usually on the road, where tools are not at hand; and the reduction of the number of tire bolts from 30 to 15 to simplify and to facilitate the removal of tires.

The complete Armleder line consists of model B, of 1-ton capacity with bevel drive; model H, of 2 tons capacity with chain drive; model E, of 2½-ton capacity with chain drive, and Model K, of 3 tons capacity, with worm drive. Wheelbase options are offered at extra cost on all models.

### ATTERBURY

*Plans for 1914 not completed*

PLANS of the Atterbury Motor Car Co., Buffalo, N. Y., for 1914 have not been definitely formulated up to the present time, but very interesting developments are promised. Owing to the thoroughness of the tests which are being carried on to determine the wisdom of making a somewhat radical departure in the method of final drive, it has been impossible to lay definite plans earlier. Much of the output of the Atterbury company is special, and for this reason the development of its stock models has been delayed. The Atterbury company claims to handle 95 per cent of the sightseeing trade in this country, besides putting out a considerable amount of fire apparatus and motor bus equipment.



As far as is known at this writing, worm drive will be used on all models up to 1½ tons capacity, and possibly on the 2-tonner, while chain drive will be continued on the 3 and 5-ton models. Option of right and left steer will be continued on the smaller models and right steer only on the 3 and 5-ton types. Minor changes that will be found in the current output are larger cooling surface on the radiators of all models, and an increase in width of 1 inch per tire on the dual rear tires of the 5-ton model.

The complete line for 1914 will be the same in capacity and model designations as the 1913 offering. It embraces model A, a 1,500-pound light delivery vehicle, last year driven by an internal-gear and bevel axle, but which probably will be worm driven this year; model B, a 1-tonner, chain driven in 1913, and probably worm driven for 1914; model R, a 1½-ton type which will in all likelihood be worm driven this year, although chain driven in 1913; model C, of 2 tons capacity, formerly chain driven, and possibly worm driven for 1914, and models D and E, of 3 and 5 tons capacity, respectively, which will be continued practically without change for 1914, retaining the chain drive.

Features in common to all Atterbury trucks are motor under the hood, unit power plant including the dry-disk clutch and selective sliding gearset affording three speeds, optional left or right steer with right control in both cases on all but the 3 and 5-ton models; fixed spark ignition by means of a high-tension magneto in a single system; dual tires in the rear on all models above and including the 2-tonner; solid tires on all models except the 1,500-pound model, on which pneumatic equipment is optional; pressed steel frames on all models except the 3 and 5-tonners and special productions; optional wheelbases on all except the smaller type; governors on the motors, and auxiliary buffer springs on all models with the exception of the 1,500-pounder.

## AUGLAIZE

*Two new models added to line*

ADDITION two new models to its line, the Auglaize Motor Car Co., of New Bremen, O., enters the 1914 field with three models instead of but one. The capacity of the larger of the new models is 1 ton, while the smaller is 1,500 pounds, like the older model. The Auglaize truck heretofore has been made in small quantities in a single model. This model has a two-cylinder motor under the seat, driving through a planetary gearset on the jackshaft to the rear wheels through double chains. Solid tires only are used on these vehicles.

The new models are substantially alike, and go by the same designation, model G. Two chassis of 1,500 pounds and 1 ton capacity comprise the additions to the line. They are equipped with four-cylinder 3½ by 5 block cast motors located under a hood forward, driving through multiple disk clutches and selective gearsets to live rear axles. The power plant used on the new vehicles is of Continental manufacture, while that on model H, the two-cylinder chassis, is a Davis.

## AVAILABLE

*Larger tires the main change*

CONTINUATION of its 1-ton delivery wagon will constitute the activity of the Available Truck Co., Chicago, in 1914. The only change that has been made is in the rear tires which have been changed from 36 by 3 to 36 by 3½.

The Available truck is a Chicago product, manufactured in moderate quantities. In its design the particular conditions to be met with in the prairie country and on Chicago's streets have been considered. The result is a truck of short wheelbase, the motor being placed at the extreme forward end of the chassis, with

the seats on either side and above it. The platform is near the ground, its maximum height when light being 34 inches.

A four-cylinder block motor, a three-speed selective gearset united with the jackshaft, with double chains, comprise the power plant and transmission system. Solid tires are used. The steering wheel is on the left side, with the levers also to the left. The frame is of pressed steel in channel section. Ignition is by means of a high-tension magneto and a battery wired in dual, the control of the spark advance being by lever on top of the steering wheel. Four types of standard bodies are fitted to this chassis.

## AUTOCAR

*Model 21-F latest in field*

MODEL 21-F, which was announced in September, 1913, will constitute the 1914 offering of the Autocar Co., Ardmore, Pa. This model is in reality the same as model 21, its immediate predecessor, with a few changes of more or less importance. The capacity of 3,000 pounds remains unchanged. The form of construction is identical.

The motor is the same two-cylinder horizontal opposed type, with longitudinal crankshaft located under the driver's seat. It has two flywheels and is connected directly to the three-speed progressive gearset, and drives through a shaft to the double-reduction rear axle.

The clutch has been refined in detail; the motor has had a fan added, just behind the radiator where formerly a fan-vaned flywheel was relied upon to cool the radiator, and the pump has been made larger.

The Autocar is characterized by its short wheelbase, 97 inches, and the position of the driver's seat over the motor, with the gasoline tank behind it, being so hinged to the chassis that it may be elevated, exposing the entire power plant without disturbing any other portion. The frame is of armored hickory, reinforced with steel.

The radiator, which is of the vertical tube type, is located below the metal dash. The springs on this vehicle are of the platform type in the rear, and propulsion is through the front portions of the rear side springs. The steering wheel is to the right, and the levers next the wheel. Ignition is by a single high-tension magneto with fixed advance. The throttle is controlled by a lever on top of the steering wheel and by a foot throttle to the right of the brake pedal. A governor limiting the speed to 20 miles per hour is fitted.

The short wheelbase made possible by the compact construction of the Autocar gives the vehicle a turning radius of 18½ feet, so that it may be turned about in a 37-foot street. Although 9 feet of load platform length is allowed, the total length of the vehicle is but 13 feet.

The front end of the load platform is 5 feet 5 inches from the extreme front of the vehicle, and yet it overhangs the rear axle but 2 feet 10 inches. The load platform is 2 feet 10 inches above ground without a load. In spite of its compact construction it is claimed that 80 per cent of the pay load is carried over the rear axle, while the weight of the chassis is so distributed that 2,100 pounds falls upon the front wheels and 2,300 on the rear.

## AVERY

*Delivery car on Glide chassis new*

THE line of motor trucks manufactured by the Avery Co., Peoria, Ill., remains identical with that of 1913, except for the addition of a 1,500-pound shaft-driven delivery car built upon the Glide chassis.

Starting with type A the Avery company first entered the commercial vehicle business with a combination truck and tractor designed for use on the farm. This truck was later supplemented by type B, intended purely for

commercial use. Type C is the latest addition to the Avery line, and is intended for lighter work than that performed by either of the earlier models. These three divisions of types differ in several points.

In type A the engine is a slow-speed, heavy-duty type with individual cylinders, inclosed under a long hood, to either side of which are small floor-boards and seats. The motor is especially adapted to tractor work. The low and convenient driving position permits the wheelbase to be comparatively short, gives the driver a position well forward and close to the road and greatly facilitates ingress and egress. It also permits the controls to be operated from a position alongside the truck, standing on the ground, this feature being of value in stationary work.

This chassis is especially intended for use in towing trailers, and to provide a proper coupling in this use, two chains are located in the rear so that they unite on the rear cross-member of the frame, and are attached to the rear axle at points nearest the brake drums, on their opposite ends. In towing, the drawbar of the trailer is attached to the union of these chains.

Type B is what is commonly known as the American type of truck, the driver's compartment being located above the motor. This construction is used to afford the driver a view both ahead and behind. The frame on this model is of rolled channel steel, and the motor is of the standard dual-cast type of four cylinders. Substantial steel inclosures are used for the chains on this type, and the construction is only moderately flexible.

Type C follows European practice, the motor being under a hood forward of the driving compartment, which is mounted directly on the frame. Exposed chains are used on this model, its design otherwise being similar to type B.

The Glide 1,500-pounder follows standard passenger vehicle practice in the chassis, having shaft drive through bevel gears. Avery trucks are made almost entirely in the shops of the company, it is said.

Of type A, two models are produced, of 2 and 3 tons load capacity, respectively. In these models the seats are located slightly behind and alongside the hoods, the driver being situated to the right, with his levers next the hood. With the exception of springs, wheels, tire sizes, gear ratio and other minor details they are alike.

Type B is made in three capacities, 2 tons, 3 tons and 5 tons. The 2-ton and 3-ton models are virtually the same, except for their springs, gear ratios, tire sizes and other minor details directly affecting load capacity.

The 5-tonner, which has only been built 1 year, has a larger motor, operating at 1,000 r. p. m. maximum speed, instead of 1,200, and has its cylinders cast in pairs instead of singly, and a longer wheelbase, 140 inches, instead of 128 inches. Besides these differences, lower reductions, larger tires and stiffer springs are used.

In type C two models are produced. These are of 1 and 2 tons capacity. They are similar in the use of left steer and center control with exposed driving chains.

The 1-tonner has a block motor, 4½ by 5½ with low-tension dual ignition, running at a maximum speed of 1,200 r. p. m. It employs a dry-plate clutch, 5-inch channel frame and has a wheelbase of 128 inches.

The 2-ton model employs the same individual-cylinder, 4½ by 5 motor used on all the other 2 and 3 ton chassis, fitted with high-tension dual ignition, automatically advanced.

## BAUER

*Motor is interchangeable*

THE Bauer 30, made by the Bauer Machine Works Co., Kansas City, Mo., is a new product of the concern, and the motor used is designed to be interchangeable with a two-



cylinder power plant used on another car made by the company and known as the Gleason. The new Bauer has a four-cylinder motor, 3½ by 5 inches bore and stroke, is thermo-siphon-cooled and is mounted on either a 1,000-pound or 1,500-pound chassis. These chassis are identical in design. A disk clutch, selective gear-set, and shaft drive to a floating rear axle are the simple running gear details. Tires are 36 by 2 inches and the control center, with right steer.

### BESSEMER

*Two new models with worm drive*

**R**ANGING in size from light delivery to light trucking sizes, Bessemer motor trucks are produced in three models by the Bessemer Motor Truck Co., Grove City, Pa. Although heretofore Bessemer trucks have been orthodox in design and construction, this season they have departed from past practice and appear in two new models with worm drive. Bessemer trucks are assembled from standard parts, so that repair parts for the two models which have been dropped may be secured as before, while new buyers are given the benefit of advanced construction. These trucks are not built upon a large scale, but are marketed generally throughout the country. It is expected to more than double the output for 1914 over that of 1913. Bessemer trucks are not changed annually, but are produced in continuous series.

The complete line consists of a 1-tonner and a 1½-tonner, both worm-driven, and a 2-ton model which is chain-driven. The first two mentioned are new models, and supersede two others of similar capacity, but with chain drive, which have been withdrawn from the market. The 2-tonner is continued practically without change except for improved brake equalizers. The 1-tonner has been found the most popular, and best adapted to a wide range of applications. The price of the 2-tonner has been reduced for 1914, the new models being offered at the same prices as those they supersede.

All Bessemer trucks have left steer and center control. The engine is controlled by both hand and foot throttles and is equipped with a governor on all models. An unusual practice found in Bessemer trucks is the setting of the governor at 15 miles per hour on all models alike. The truck is built upon a pressed steel frame, with wood wheels and semi-elliptic springs all around. All brakes are located on the rear wheels, and either solid or pneumatic tires will be applied to any model. The Bessemer is a representative of the single ignition faction.

### BARKER

*Quadruple power plant a feature*

**T**HE feature of this truck, made by C. L. Barker, Norwalk, Conn., is what is termed a quadruple unit plant, which consists of a motor, clutch, gearset with brake and control levers and a steering gear. This unit assembly is suspended from three points and it is claimed the entire installation is removable in 30 minutes. The motor used is of the conventional block-cast type, with bore and stroke of 4 by 5 inches, is located under the hood and drives a disk clutch and four-speed selective gearset to a worm-gear rear axle. The Barker has left drive and center control and is fitted with 42 by 3½-inch tires in front and 42 by 5-inch in the rear, and has a capacity of 2,000 pounds.

### BLAIR

*Worm drive a strong talking point*

**C**HARACTERIZED by worm drive, compact design, with the motor between the seats, a rigid sub-frame attached to the main frame on two points in front and at one on the rear axle, the entire transmission line being straight and rigid, no universals being employed, a pressed steel frame, constant-mesh gearset, and removable unit construction, the Blair

truck for 1914 remains unchanged in cardinal principles of design. Although a 5-tonner has been catalogued by the Blair Mfg. Co., Newark, O., the regular models range in capacity from 1½ tons to 3½ tons.

The complete line consists of a 1½-ton, a 2½-ton, and a 3½-ton truck, identical in layout although differing in the size of parts directly in relation to the weight of the load. Refinements in these models are of such a minor nature, and have so little effect upon the actual operation of the vehicle, that they are not worthy of mention.

The motor, gearset and driveshaft are rigidly mounted on a narrow sub-frame of rigid pressed steel, supported on spring hinges from the main frame in front of the motor, and on annular bearings in front of and behind the worm on the rear axle housing. The front supports permit the entire power plant to rock vertically in response to the oscillations of the rear axle, the springs absorb the vibration between the frame and the sub-frame, and retain the motor in its correct lateral relation with the frame, yet permitting a certain amount of flexibility to allow for the warping of the frame on rough roads.

The motor, which is a Continental, 4½ by 5½, is cast in block with valves on the left with their mechanisms inclosed. The clutch, of the cork-inserted cone type, is located in the exposed flywheel for accessibility. The gearset is of the Cotta constant-mesh individual clutch type. The gears are always in mesh, gear changes being effected by sliding dog-clutches. It affords 3 speeds on the selective plan. Final drive is through a straight-type overhead worm to the live rear axle.

The driver's position is to the right of the motor, the levers to the outside. This driving location is so far to the side and close to the ground that by merely turning his head, it is said, the driver may see the rear wheel. The control of the motor is by hand throttle only, ignition being by a single high-tension Simms magneto with fixed spark.

Motor governors are fitted to all models, regulating the speed of the 1½-ton model to 14 miles per hour; the 2½-ton to 12; and the 3½-ton to 10 miles per hour, although this is sometimes changed by the manufacturer on application of the user, where conditions of service merit. Gear ratios likewise are varied to suit the purchaser's requirements. Solid tires only are fitted.

Liberal wheelbase options are given, three lengths being standard on each model. On the 1½-tonner, 114, 121, and 135-inch wheelbases are offered; and on the 2½ and on the 3½-ton, 121, 135, and 144-inch options are given. The Blair company owns and operates its own body shop, and while it carries two stock styles of bodies for rush deliveries, it is prepared to build any type of body required by the user.

### BROCKWAY

*Few changes have been made*

**T**HE Brockway Motor Truck Co., Cortland, N. Y., continues its four models practically without change. These trucks, which range in capacity from 1,500 to 3,500 pounds, are characterized by their three-cylinder two-cycle air-cooled motors, their high wheels, wood frames, French hoods, left drive, and elliptic springs in front. All four models follow practically the same lines.

The complete line consists of model A, rated at from 1,000 to 1,500 pounds; model B, rated at from 2,000 to 2,500 pounds; model C, rated at from 2,000 to 2,500 pounds; and model D, rated at from 3,000 to 3,500 pounds. The principal difference between models B and C is in the gearset, that on model B being of the planetary type, and that on model C of the selective sliding gear pattern.

For the first time, the Brockway is offering four-cycle motors of Continental manufacture on its models as optional equipment instead of the Brockway two-cycle engine. This

step has been taken to accommodate buyers whose prejudices are against the two-cycle motor.

The Brockway engine is of the two-port type, all of the movements of both prime, transfer, and exhaust gas being controlled by the piston. It is mounted directly to the frame by means of forged steel cross-arms secured at one point in front and two points at the rear portion.

It is cooled by means of fins cast in the individual cylinders, over which a blast of air is drawn through an opening in the front of the hood by the vaned flywheel. It is ignited by a high-tension Bosch magneto with fixed spark, the magneto being driven from the crankshaft directly, and mounted at the extreme front of the engine.

Lubrication is effected by admixture of a special lubricating oil with the fuel. Inasmuch as the fuel is first taken through the crankcase before being introduced into the cylinders, the oil held in solution by the gasoline is precipitated on the bearing surfaces in the passage of the fuel.

Left steer and center control are used on all models. On models A and B a two-speed planetary gearset is employed, while on the others, three-speed selective gearsets and cone clutches are features.

### BUICK

*Commercial vehicle on new lines*

**A**LTHOUGH the 1914 Buick commercial vehicles were announced and a sample vehicle shown at the shows a year ago, it was not until late in the summer that they actually appeared, and were scheduled then as 1914 models by the Buick Motor Co., Flint, Mich.

The new Buick is unlike any previous production of this company. It is not like the passenger vehicles, for it uses an L-head motor instead of the valve-in-the-head type which has always characterized Buick passenger vehicle productions. All previous Buick commercial vehicles have had their motors under the floor boards and of the two-cylinder opposed type, driving through a planetary gearset by a chain.

The new model departs from all this, having a four-cylinder L-head motor with cylinders cast in block and valves on the right side. Transmission is through a three-speed selective gearset and shaft drive of a bevel-gear rear axle of the semi-floating type.

Although the new vehicle is produced in two capacities, 1,000 pounds and 1,500 pounds, the two chassis are practically identical except as to the strength of the rear springs, length of frame, tire sizes, and wheelbase.

The two chassis are designated No. 3 and No. 4, the former of 1,000 pounds capacity, 100-inch wheelbase, and 33 by 4½ tires; and the latter of 1,500-pound capacity with a 122-inch wheelbase, and 35 by 5 tires.

In other respects they are substantially the same. The motor is 3 by 5 inches, with valves on the right. It is lubricated on the circulating-splash principle, ignited by a high-tension magneto in a dual system with a battery, with hand advance, and restricted in speed by a governor set for a speed of 25 miles per hour.

A cone clutch connects the motor with the three-speed selective gearset, which is operated by central levers, the steering wheel being on the left. Both the motor and gearbox are mounted on a sub-frame which may be quickly dismounted from the main frame and these units removed without disturbing the rest of the frame.

The rear axle is of the semi-floating pattern, bevel driven. The drive shaft is inclosed in a tubular torsion member which also takes the propulsion of the vehicle. This member is secured to a cross-member of the frame by a large yoke just back of the gearset. The rear springs are elliptics, and are said to be sensitive whether the vehicle is light or loaded. Pneumatic tires only are supplied on Buick trucks.



Each chassis has five standard bodies, and in addition chassis will be sold stripped, to enable the buyer to have his body built locally to his own specifications. No. 3 chassis may be turned in a circle whose diameter is 39 feet 3 inches, and No. 4 in one of 47 feet.

## COUPLE-GEAR

*Four-wheel gas-electric drive*

**T**WO models of gasoline vehicles are produced by the Couple-Gear company, both of which have electric transmission. One model is a self-contained truck and the other a four-wheeled semi-tractor.

Characteristics which distinguish these vehicles, made by the Couple-Gear Freight Wheel Co., Grand Rapids, Mich., are four-wheel drive, four-wheel steer, engine under the seat, electric transmission, the generator being direct-connected to the engine, right steer, and control by means of a street car type controller. These vehicles are readily adapted to special requirements owing to the ease with which changes in wheelbase, tread, etc., may be made. The engine and generator are independent units and are connected to the motors only through wires.

Each wheel is a separate unit, containing its electric transmission motor, and being mounted upon its own spindle. The controller and steering gear is so arranged that it may conveniently be mounted in almost any position. All Couple-Gear wheels are interchangeable, and the same size and power wheel is used on all of these vehicles, whether battery or generator driven.

Stock models are fitted with four-cylinder engines, 5½ by 6, with cylinders cast separately. The motors are suspended from a three-point sub-frame and directly connected to an electric generator. On the truck model and tractor model all four wheels steer in unison, and all wheels are equipped with contracting brakes. The wheels are made of steel disks, and are hollow. Between the disks is the electric motor. On the ends of the armature shaft are bevel pinions which engage teeth cut on the periphery of each disk. The wires which lead to the motor are passed through the hollow spindle of the wheel. Each spindle is integral with a steering knuckle.

The axles are built up of forged steel, in the form of a truss. Rolled steel frames are used, and while the standard wheelbase of the truck is 144 inches, this may easily be modified or amplified to suit the purchaser's requirements. The truck has a maximum capacity of 6 tons, but may be made with lighter springs, etc., to accommodate loads down to 3½ tons. The tractor is intended to be used in conjunction with a two-wheeled trailer, and will sustain 6 tons on its drivers. To support the front end of the trailer, its frame is fitted with a fifth wheel and the king-bolt, and the wheelbase is considerably shortened.

The control of the vehicle is by means of spark and throttle levers on top of the steering wheel, by the controller, mounted on the front of the seat, and by pedals which operate both front and rear wheel brakes. The controller affords five speeds in either direction.

To enable the operator to vary the gear ratio, a rheostat is connected to the fields which enables the operator to vary the field resistance. This feature takes the place of the gearset. Five types of special bodies are provided on the truck model, and special bodies will be built to order.

## CLARK

*Company's plans are not complete*

**L**ATE maturity of its plans prevents a full description of the Clark delivery car, made by the Clark Delivery Car Co., Grand Crossing, Ill. As far as is known at this writing it will have a 144-inch wheelbase, a pressed steel frame, its motor under a hood forward, a Continental motor, Brown-Lipe gearset, and

a bevel-driven rear axle of a special design built in the Clark factory.

Features which distinguished this vehicle last season are retained. Prominent under this head is the radiator which has an aluminum base and top, into which ¾-inch copper tubes are rolled and beaded by means of a brass plate. The radiator is mounted on springs.

The power plant as a whole is mounted on a three-point sub-frame, the front supports being rigid, and the rear one a ball joint. The entire power plant is easily removable by taking out the sub-frame. The weight distribution, both empty and loaded, is said to be about 20 per cent on the front wheels and 80 per cent on the rear. Ten feet of loading space back of the driver's seat is allowed. Steering is on the left, and the gearshift levers in the center. The vehicle will have a capacity of 1,500 pounds.

## COMMERCE

*Friction and chain drive are features*

**N**OW 3 years old, no changes of moment have been made in Commerce light delivery truck, made by the Commerce Motor Car Co., Detroit, Mich., which is made in a single chassis model of 1,000 pounds capacity. For simplicity a friction change-gear is used, final drive being by single chain to a semi-floating rear axle. This friction change-gear is manufactured in the Commerce plant, and is especially designed with a small disk and large wheel for commercial work.

The location of the steering wheel is to the left, with the change-speed lever also to the left. The steering gear has been made heavier, and control parts have been strengthened for 1914, otherwise the chassis is unchanged. Carrying out the idea of simplicity, the vehicle is equipped with fixed spark high-tension magneto single ignition. This spark is advanced conservatively for three reasons. The first is that this permits the motor to exert its full power on hills and in sand without knocking, the second is that it prevents sudden pick-ups, thus saving the truck from unnecessary stress, and the third is that it prevents a greater motor speed than 1,800 revolutions per minute.

No foot throttle is fitted because sudden acceleration is not desired, nor is manipulation of the throttle considered as necessary with the friction change-gear, because the steps may be made closer together. No governor is fitted, as the vehicle is built for speeds up to 20 miles per hour, beyond which it is said the truck cannot be driven, owing to the position of the spark.

Pneumatic tires are stock equipment, but for work in which speed is not essential, such as for contractors, plumbers, etc., solid tires are fitted on option. No wheelbase options are offered, although a slight variation in body length is permitted.

Bodies in four different styles are carried by the Commerce company. These bodies are designed to cover all general classes of light delivery work.

## CLEVELAND

*Designed for fast delivery service*

**M**ARKETED by C. D. Paxon, Cleveland, O., and made by the E. C. Clark Motor Co., Jackson, Mich., the Cleveland truck is one of the newcomers introduced in 1913. It is a light delivery vehicle of 1,500 pounds capacity mounted on pneumatic tires.

Its principal features are motor under the hood forward, a four-cylinder engine, pressed steel frame, and right steer and control. It is designed for fast delivery service, and its sale is being promoted throughout the east and middle west. But one chassis is produced, with one wheelbase.

The motor is 4½ by 4½ with the valves inclined at 45 degrees in the cylinder heads. The valves are operated by an overhead camshaft. With the motor, as a unit power plant is

the inclosed flywheel containing a three-plate dry-disk clutch, and the three-speed selective sliding gearset.

Ignition is by means of a low-tension magneto in a dual system with a dry battery, the advance being hand controlled. The throttle is controlled by a hand lever on top of the steering wheel. No governor is fitted, as the vehicle is intended for high speed. The final drive is through a shaft which it is claimed is approximately straight when under load, to a bevel-driven rear axle of the semi-floating type.

## CORBITT

*Adheres to one-model policy*

**O**NE of the few commercial vehicle builders located in the southern territory is the Corbitt Automobile Co., Henderson, N. C., which produces a medium-sized truck rated at 2,500 pounds capacity. It finds its sale principally in its own territory, to the conditions of service in which it has been especially adapted in design.

It is saliently of the European type, the motor being located beneath the hood in front of the driver's compartment. It follows standard lines mechanically, having a selective gearset and chain drive. The frame is of pressed steel. Solid tires are regular equipment. It is not produced in yearly models, nor are extensive changes in construction, such as wheelbase, etc., made to suit the whims of purchasers.

By concentrating on one chassis with but little variation, year after year, making refinements wherever necessary instead of holding them for the beginning of a new season, production is cheapened. The factory in which it is assembled was specially built for the purpose, passenger vehicles also being a product. It is sold as a chassis, body work being optional at extra cost.

The only change that has been made in the Corbitt since a year ago is the substitution of a Hele-Shaw multiple-disk clutch for the cone type used in former years. The motor is a Continental L-head type, 3½ by 5½, with cylinders cast in block, valve mechanisms being inclosed. The radiator is of the cellular type and is mounted on springs. Steering is by a wheel to the left and control levers are in the center, the spark and throttle levers being located beneath the wheel. The gearset is a Brown-Lipe three-speed selective type, mounted as a unit with the jackshaft. Tires 36 by 3½ in front and 40 by 4 in rear are used. All four brakes are on the rear wheel drums, and the rear springs are underslung. To limit the speed a centrifugal governor is fitted.

## CHASE

*Changes to worm drive with four-cycle engine*

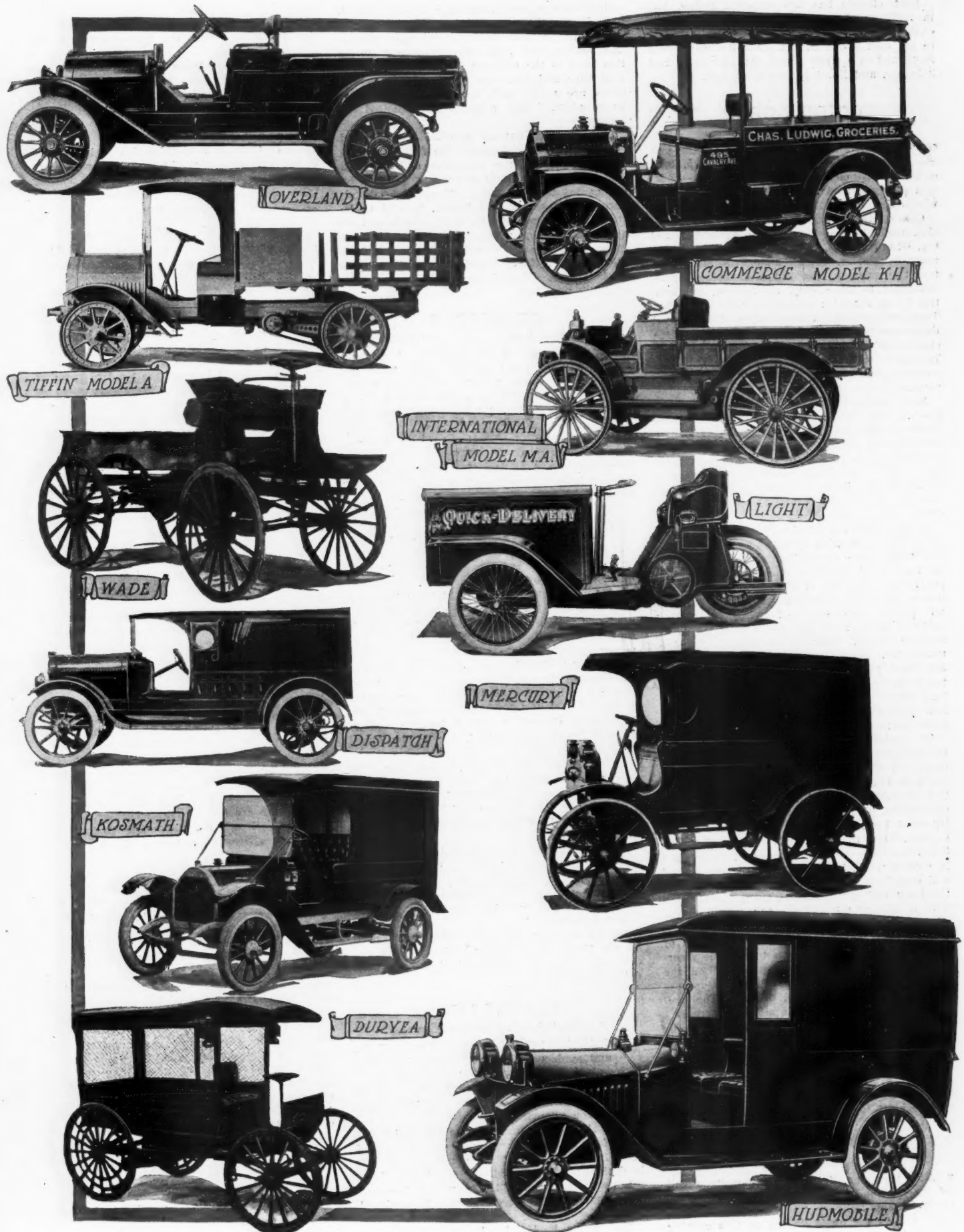
**T**O its five models ranging in capacity from 1,000 pounds to 2 tons, the Chase Motor Truck Co., Syracuse, N. Y., has just announced the addition of two new designs which are radical departures from the concern's previous practice. The older models are chain-driven from jackshafts and have two-cycle air-cooled motors. The newcomers are a 3-ton worm-driven type with a four-cycle water-cooled engine, and a 3,000-pound model having side chains and jackshaft and four-cycle water-cooled engine also. The new 3-ton has two wheelbase lengths—148 and 165 inches—and the standard body is 122 by 52. The 1½-ton has 146 and 160. The new engines are Continentals, 4.5 by 5.5 and 4.125 by 5.25 inches respectively.

## COLEMAN

*New motor in 2-ton model*

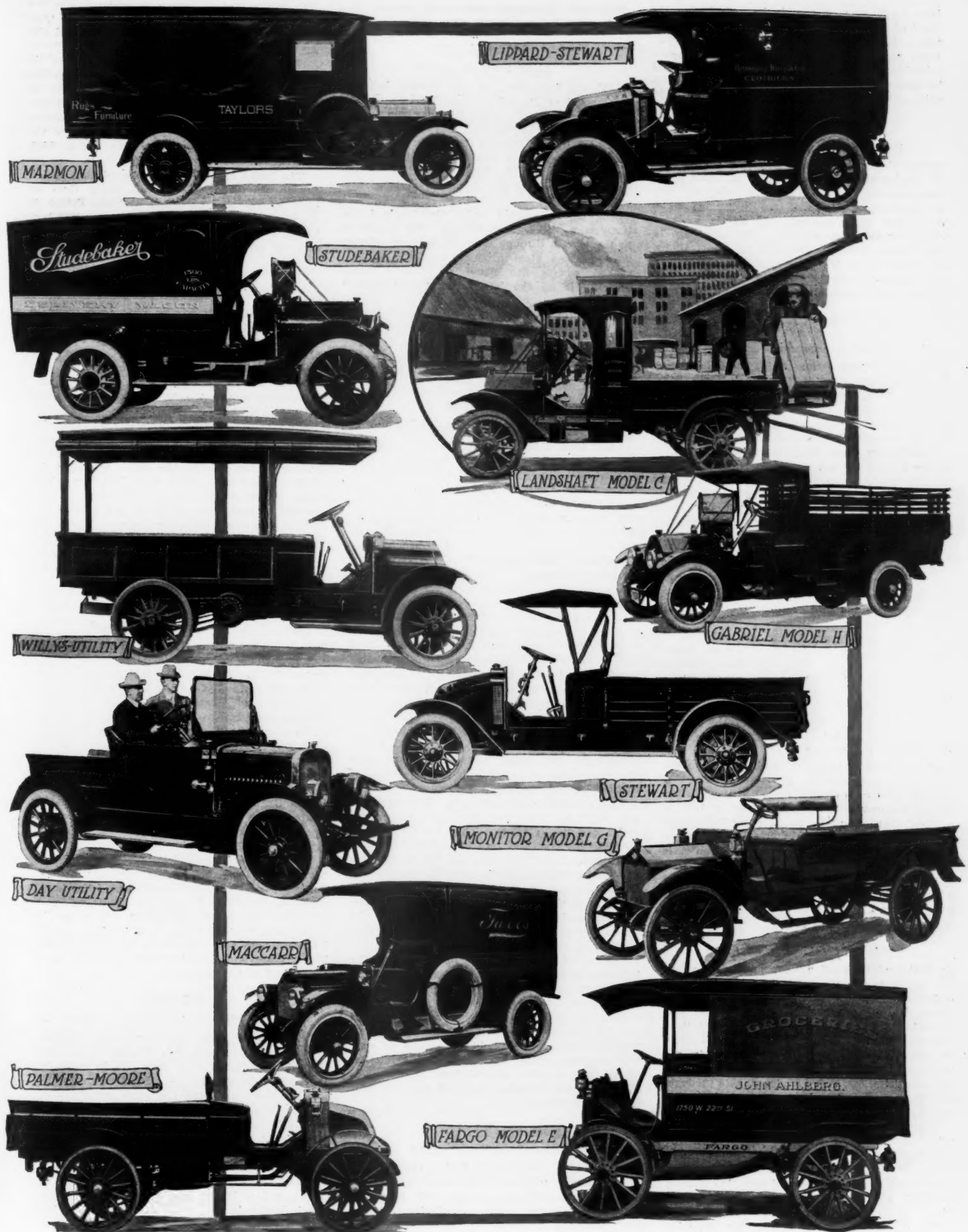
**A** SINGLE chassis is offered by the Coleman Carriage & Harness Co., Ilion, N. Y., in two capacity styles, 1-ton and 2-ton, and for 1914 the 2-ton chassis has a larger motor, of 4¼ by 5¼ inches bore and stroke, as against 3¼ by 5¼ last year. The motor has





Small Vehicles Designed for Fast Delivery Work





Delivery Wagons of Not More Than 1-Ton Capacity for General Utility Work



been made more accessible by redesigning the front of the car. The 1-ton truck, known as the model B, uses the same motor as last year. Both cars drive by cone clutch, three-speed selective gearset a unit with the jackshaft, and by side chains to the wheels. They are right-drive and right-control vehicles.

## CONTINENTAL

*Minor refinements in single chassis*

THE single chassis offered by the Continental Truck Mfg. Co., Superior, Wis., has a maximum capacity of 3,000 pounds. The car has the motor located under the floor, has right drive and right control, and drives by side chains to the rear wheels. The wheelbase is 110 inches, the tires 36 by 3 in front, 40 by 3½ in the rear. The four-cylinder motor drives through a cone clutch and three-speed selective gearset and jackshaft with semi-floating rear axle.

## CROWN

*Takes up worm-driven axle*

CROWN vehicles for 1914, made by the Crown Commercial Car Co., North Milwaukee, Wis., are entirely different from the product of 1913. Two models of 1 and 2 tons capacity, respectively, are produced, following similar lines in all but minor details.

The Crown truck this year is of the motor under the hood type, as formerly, but instead of the double chain drive, worm drive is employed. Instead of the rigid gusseted frame of carbon steel formerly used, flexible construction has been adopted, with a three-point sub-frame for the entire power plant. Instead of dual ignition, a single high-tension spark system is employed, with fixed advance on both models, Bosch magneto being used. Four-speed gearboxes and improved ratchet grease cups complete the tale of trends shown in the development of these trucks.

The two models are known as model B, of 1-ton capacity and model C, of 2 tons capacity. These models differ in the following points: model B has a block motor with a bore of 4 inches and a 5-inch stroke, while the motor on model C is 4½ by 5 with the cylinders cast in pairs. The first is of the L-head type, the valves being on the left side, and the last of the T-head type. Both are governed at 1,000 r. p. m. The oiling system employed is a non-splash pressure system. A leather-faced cone clutch located in the flywheel drives a four-speed selective gearset amidships.

Final drive from the power plant is through a shaft approximately in a straight line when under load, to an overtype worm-driven axle of the three-quarters floating type. This axle is built by the Crown company, the worms and wheels being imported from David Brown & Son, England.

## DART

*Adds light vehicle to its line*

BY the addition of a new model, known as model A, the range of the 1914 Dart line embraces capacities from 750 pounds to 2 tons. These are the product of the Dart Mfg. Co., Waterloo, Ia. The new model is a very light vehicle, designed for use in small retail work. It carries out the principles embodied in the larger models. Dart trucks are made in moderate quantities, and enjoy a general sale throughout this country. They are not made in yearly models, but in continuous series.

The new model is remarkable for its low price of \$800 and its low capacity of 750 pounds. It is fitted with a four-cylinder block-cast engine, 3½ by 4, driving through a cone clutch and a three-speed selective gearset to double chains. All brakes are on the rear wheels in this model as in all other Darts.

The other two, model B of 1-ton capacity and model C of 2 tons capacity, follow the same lines, excepting that they are larger and heavier. Either solid or pneumatic tires are fitted to any or all models, pneumatics being

preferred. Left steer and center control is a feature in common with all models.

## DE KALB

*Light truck is coming*

AT the beginning of the season but one model of De Kalb truck, built by the De Kalb Wagon Co., De Kalb, Ill., was being manufactured, plans having been laid for the production of a lighter type in the near future. The present model has a capacity of 2 tons. It is designed for regular trucking within its capacity and follows the European style of layout.

The motor, located under the hood, drives through a three-speed gearbox and jackshaft to the wheels through open chains. The frame is a pressed steel product, and the square-spoked wheels are fitted with solid tires. Steering is on the left, with central control levers.

The motor employed is a Continental 4½ by 5½, connected with the gearset through a leather-faced cone clutch fitted with a clutch brake. The gearset is of the three-speed selective pattern and is carried amidships and rigidly attached to the gearset.

## DAIN

*Adds 1-tonner, novel drive, feature*

THE Dain light truck is the product of Joseph Dain, a veteran manufacturer of agricultural implements and master mechanic of the John Deere Co., Moline, Ill. The Dain truck, made by the Dain Mfg. Co., Ottumwa, Ia., is new, although an experimental 3-tonner identical except in size and minor details with the 1-tonner now on the market has been on the road 3 years. Besides this, the Dain truck is new in design. It is the first recorded combination of the friction change-gear, direct drive on high gear, and final drive through worm gearing, on the American market. The type of friction change-gear is also new.

The motor is carried at the extreme forward end of the chassis, the seats and floor-boards being located on either side. It is suspended from the frame at but two points, these being hinge-joints that permit longitudinal movement. At the rear it is rigidly bolted to the change-gear case within which the flywheel is inclosed. The change-gear in turn is rigidly secured to the torque tube which surrounds the driveshaft, and which is rigidly attached to the rear axle housing.

The friction change-gear is different from the usual form in that there are two disks, which are merely idlers. They are disposed at an oblique angle, and face inward and upward. The flywheel, which is the driving member, is fitted with flanges which normally engage the friction faced edges of the disks. Drive is taken from the disks by a wheel on the drive-shaft. It is longitudinally movable on its shaft, so that it may be adjusted for any speed, neutral, or reverse.

Control of the vehicle is by means of the left-side steering wheel, with the spark and throttle levers thereon, ignition being by a K. W. high-tension magneto in a single system; a pedal to control the raising or lowering of the friction wheel into or out of engagement with the disks; a lever in the center to control the longitudinal movement of the friction wheel; and a pedal which simultaneously applies two sets of brakes, internal and external, in the rear wheels.

## DURYEA

*A two-cycle delivery wagon*

FORMERLY manufactured by the Brooks Co. under a license from the Duryea company, Duryea delivery cars are this year put out by the Duryea Motor Co., Saginaw, Mich. They are built in two models of 800 and 1,000 pounds capacity.

Outstanding features are the power plant, method of drive and the location of these parts. In general make-up the trucks follow

the design of the Duryea Buggyaut. The motor is a two-cylinder, two-cycle, air-cooled type, the two cylinders being set horizontal and side by side.

The crankshaft of the engine drives directly to the wheels through grooved rollers at its ends which engage grooved sheaves on the wheels. The power plant is shifted forward and back to give forward and reverse speeds, while the rollers at the ends of the shafts are slid in or out to give low or high speeds.

The brake consists of a grooved shoe which fits in the grooved sheaves. Solid tires on high wheels are employed, and the frame is of pressed steel. Three types of standard bodies are fitted or special bodies will be applied at extra cost.

## DISPATCH

*Buggy-type vehicle is dropped*

MARKED improvements have been made in the Dispatch vehicle for 1914. This truck is built by the Dispatch Motor Car Co., Minneapolis, Minn. It is made in one chassis model for 1914, of 1,000 pounds capacity. Instead of the motor buggy type of vehicle produced previously, the new truck is provided with a 3½ by 5, four-cylinder water-cooled engine, located under a forward hood and driving through a shaft to a combined clutch, gearset, differential and jackshaft in the middle of the car, from which the drive is taken by double chains inclosed in metal housings. The usual double set of brakes, both operating on the rear wheels, are provided, and lubrication is by a non-splash pressure system. The truck has been made considerably lighter, and because of this ball bearings have been substituted for the roller type used in the wheels on previous models.

## DIAMOND T

*Worm-driven truck continued*

NO changes of note have been made in the Diamond T model J 1½-ton worm-driven truck, excepting the addition of a 144-inch option to the 127-inch standard wheelbase. This wheelbase length permits a 12-foot loading platform to be used. The car is the product of the Diamond-T Motor Car Co., Chicago.

The motor is a Continental 4½ by 5½, fitted with a dry-disk clutch, a Brown-Lipe three-speed selective gearset, and a Timken-David Brown worm-driven axle in which the worm is carried above the wheel. Ignition is by a Bosch high-tension magneto in a single system with fixed spark.

The chain-driven models are 3 and 5-tonners, respectively, being characterized by their under-the-hood motor location, disk-in-oil clutches, three-speed selective gearsets, and exposed chain drive. A 4½ by 5½ motor is used on the 3-tonner and a 5 by 5½ on the 5-tonner, both being furnished with Bosch dual high-tension ignition with hand advance, right steer, and right control.

## DORRIS

*3-ton model added to line of trucks*

THE Dorris line of commercial vehicles comprises three models ranging in capacity from 1,500 pounds to 3 tons. It is made by the Dorris Motor Car Co., St. Louis, Mo.

All models carry out the same principles of design. The power plant which is used in all models is the Dorris valve-in-head motor, dry-disk clutch and gearset, assembled in a unit, and driving to the live rear axle through a shaft and bevel gears.

Pneumatic tires are fitted on the 1,500 pound model, and solids on the heavier types. The Dorris motor is 4½ by 5, the cylinders being cast in pairs. It is water cooled, an unusual feature being the absence of hose connections, copper tubing taking their place. A governor is fitted to all motors this year, for the first time.



The rear axle on all models is bevel driven. That on the 1,500-pounder is a floating type with a single reduction, while those on the larger models are of the double-reduction type, with a drop forged axle center. Springs on the 1,500-pounder are platform in the rear and semi-elliptic in front. Other models have semi-elliptics.

Dorris trucks are sold as chassis only, bodies being furnished solely on special designs.

### FEDERAL

*Little alteration this year*

**S**UBSTANTIALLY the same 3,000-pounder as formerly produced is offered for 1914 by the Federal Motor Truck Co., Detroit, Mich. It follows conventional lines, the motor being under a hood forward and driving through a cone clutch and selective gearset to a jackshaft and double chains.

The engine is a Continental 4½ by 5¼, cast in block, and fitted with a camshaft-driven governor which is completely sealed, and if these seals are broken the guarantee of the truck is invalidated. The governor is set, according to the S. A. E. standards to limit the speed to 15 miles per hour. It is claimed that the Federal is the first 1½-ton truck to adopt these standards. None are sold without sealed governors. Ignition is by an Elsemann high-tension magneto with fixed spark.

Wheelbase options of 120 or 144 inches are offered. The company furnishes standard bodies, and because of its specialization on one chassis. One of these is its unit body, which may be adjusted in six variations to different requirements.

### FLINT AND BEST

**C**ONTINUING its 1,000-pound model A and 1,600-pound model C, under the names Best and Flint, respectively, the Durant-Dort Carriage Co., Flint, Mich., announces no changes for 1914. These vehicles differ in that the Best has a two-cylinder horizontal opposed motor under the floor, driving through a friction change-gear and double chains, and has elliptic springs in the rear, while the Flint has a four-cylinder vertical motor, fitted with a cone clutch, three-speed gearset and shaft drive through bevel gears.

The Best claims individuality in several features. The motor is supported by a cast subframe which likewise supports the change-gear and jackshaft.

The Flint truck has a 3¼ by 4½ block cast motor fitted with a governor limiting the speed to 18 miles per hour.

### FOUR-WHEEL-DRIVE

*Drives on four and steers on fore wheels*

**T**HE Four-Wheel-Drive is made by the Four-Wheel-Drive Auto Co., Clintonville, Wis. Two models of 1½ tons and 3 tons, as formerly, are produced. The drive is transmitted to all four wheels by using floating axles front and rear, driven by shafts terminating in a common gearbox. The rear axle is similar to the ordinary bevel-driven axle except that the differential instead of being located in the center of the axle is to the left of the center. The front axle is like the rear axle, excepting its ends, which differ in that they are dirigible. This dirigibility is secured by extending the tubes to form halves of hollow globe joints, within which are universals which transmit the torque of the live axles to small stub axles within the hollow wheel spindles, and which, in turn, are clutched to the wheels.

From the gearset the drive is taken by a silent chain to a differential which distributes the power to the two driveshafts.

Brakes are located both in the rear wheels and on the driveshafts. Each shaft has two universals, and propulsion is taken through the springs. To provide against the contingency of a shaft breaking or a derangement of the driving or differential gears in either side,

locks are fitted to the sides of the central differential which makes it possible to throw either axle out of commission, and drive with the other.

### FARGO

*Unique friction drive*

**T**HE Fargo 1,500-pound truck embodies a number of unusual features. It is produced by the Fargo Motor Car Co., Chicago. Features which are especially worthy of note are its friction drive to a driveshaft located on one side of the chassis, final drive being through bevel gears to the live rear axle.

This vehicle is provided with a two-cylinder horizontal opposed motor, the cylinders being located longitudinally. The flywheel is used as the friction disk. The complimentary wheel in the friction drive is keyed to the driveshaft, which is arranged to slide sideways toward or away from the flywheel. It is equipped with two universals.

### GENEVA

*Thousand-pound wagons offered*

**T**WO models of 1,000 and 1,200 pounds capacity, equipped with open and closed bodies, respectively, of Geneva commercial vehicles are continued for 1914 by the Geneva Wagon Co., Geneva, N. Y. The only change that has been made is in the substitution of thermo-syphon cooling for the pump formerly employed.

The Geneva vehicle is built upon a single chassis, the two models being equipped with open and closed bodies, respectively, as standard. It has a wood frame, slung on elliptic springs in the rear. The motor is located in a low hood in front of the front axle, with the radiator behind it, occupying the usual place for the dash. The engine is a two-cylinder horizontal opposed type, 5½ by 4½, and drives through a planetary gearset to the jackshaft, from which the drive is transmitted by double chains.

### G. V.—MERCEDES

*American-built German truck*

**M**ERCEDES motor truck, manufactured in America by the General Vehicle Co., Long Island City, N. Y., is built in a single chassis model of 6 tons capacity.

The G. V.-Mercedes is an exact duplicate of the German truck. It has shaftdrive through an internal gear rear axle. The vehicle has steel wheels with right steer and control.

The Mercedes motor consists of four cylinders cast in pairs, with the valves in the head, and a bore and stroke of 4¼ by 5½.

The gearbox is of the non-direct drive pattern. The mainshaft is disposed immediately above the lay shaft, the latter of which is connected to the drive shaft through a universal joint. This permits the motor to be carried high in the frame by which its accessibility is greatly increased and at the same time gives an approximately straight line drive from the gearset to the rear axle.

The truck is fitted with a governor of the revolving ball type which restricts the speed of the motor to 850 r. p. m., an approximate vehicle speed of 10 miles per hour. The G. V. truck is so built that it can be economically operated with a trailer carrying its full rated load. In its demonstrations in and about New York City it has been customary to carry 6 tons upon the truck and 4 tons on the trailer. The truck has a turning radius of 25½ feet or a turning circle of 51 feet.

### GOLDEN WEST

*Designed for the western market*

**G**OLDEN WEST MOTORS CO., Sacramento, Cal., has entered the field with a design especially intended for California service. This truck is four-wheel-driven and steered. It is provided with a standard Continental motor mounted together with the gearset on a separate sub-frame, supported from the main frame on springs, so as to render it indepen-

dent of road shocks or vibration. The gearset is of a novel type, the gears being separated, and instead of meshing with one another, are connected by Whitney silent chains. From the lay shaft which takes the drive, shafts extend forward and back to Sheldon worm-driven axles, fitted with especially designed universal joints with a maximum deflection capacity of 35 degrees. The experimental model of 2 tons capacity is now undergoing road tests.

### GABRIEL

*Two new chassis offered*

**T**HE W. H. Gabriel Carriage & Wagon Co., Cleveland, O., has discontinued its model G and offers two new chassis known as the models L and K. The models J and H are continued unchanged. The model K is of low capacity and has a four-cylinder motor under the hood. The bore and stroke measures 3½ by 5 inches; the cylinders are of L-head construction cast in block, and are thermo-syphon-cooled. The motor drive is taken by a cone clutch to a three-speed selective gearset and then transmitted by shaft and bevel gearing to the rear axle. This and all Gabriel cars for 1914 have left drive and center control. The other new car, model L, has a motor of 4½ by 5¼ inches bore and stroke and is the same as the K except that it has pump cooling. The running gear is the same except that a four-speed gearset is used instead of a three. The wheelbase on the model L is 154 inches.

### GARFORD

*Five sizes offered for 1914*

**G**ARFORD CO., Elyria, O., has a line of five models ranging in capacity from 2 tons to 6 tons. The motor is between the seats, and inclosed under a hood, with the radiator in front. The cab is placed directly over the motor and built out over the wheels.

The drive from the motor is in a straight line to the combined gearset and jackshaft, which affords four forward speeds.

In the above features all Garfords from the 2-tonner to the 6-tonner are identical. Each, however, is different in size. All models use the same motor, which is of four cylinders, block cast, 4¼ by 5¼, with the valves on one side. Ignition is from a Bosch dual magneto. The governor is completely sealed so that it cannot be tampered with without breaking the seal.

All models are equipped with leather-faced cork-inserted cone clutches which drive to the combined gearbox and jackshaft. This member consists of a large rectangular case and arranged for three speeds on the 2, 3 and 4-ton models, and for four speeds on the larger two.

Two wheelbase options are offered on each model, and these two options apply to all, 128 and 150 inches, respectively. Tires, of course, differ on each model. One of the features of the Garford truck is the fact that the driving sprocket and the driven sprocket are horizontally in line.

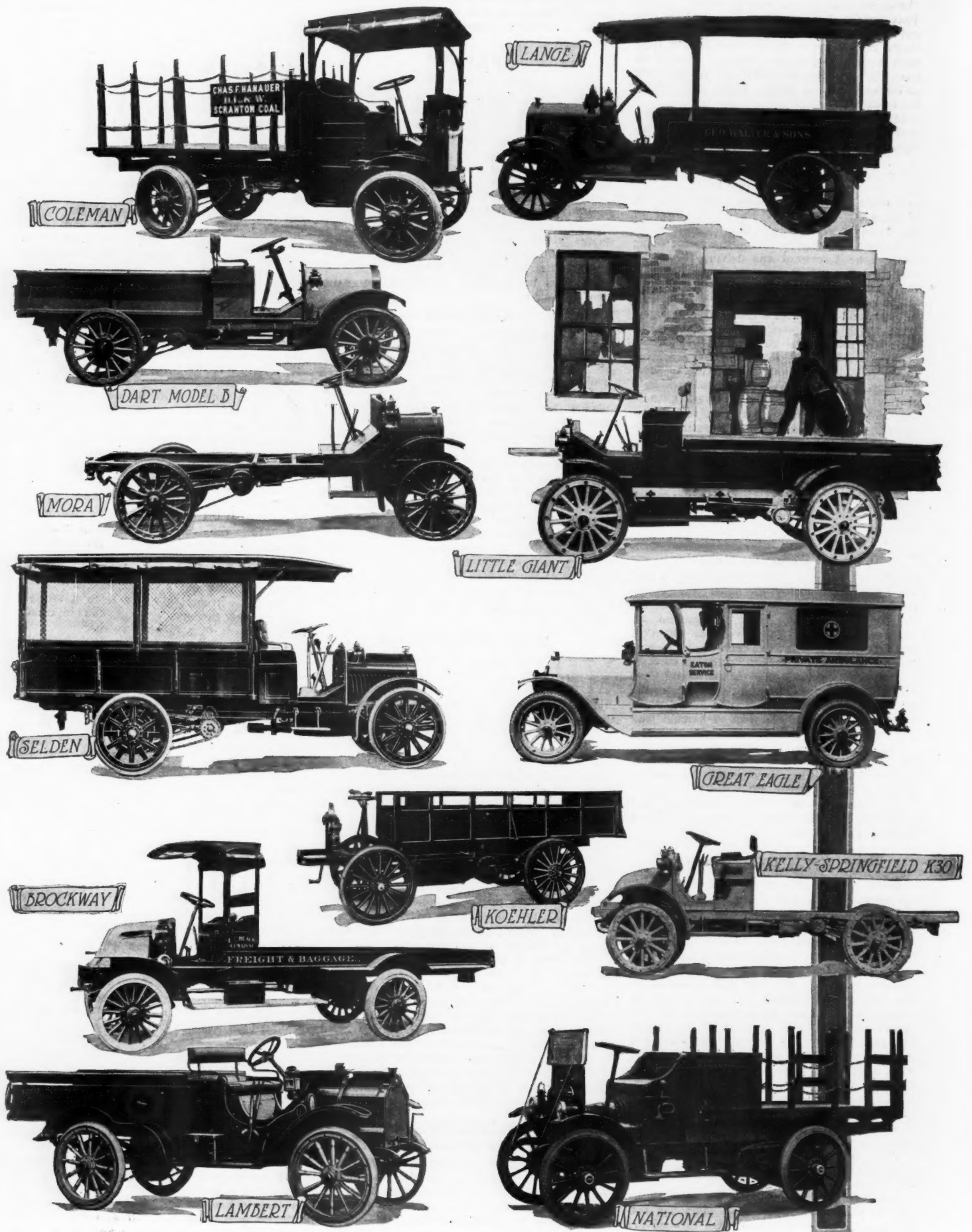
Besides its regular truck models, the Garford company has built a number of short-wheelbase 5-ton tractors designed to be used in connection with two-wheel semi-trailers to haul 10-ton loads.

### GREAT EAGLE

*Starter added to equipment*

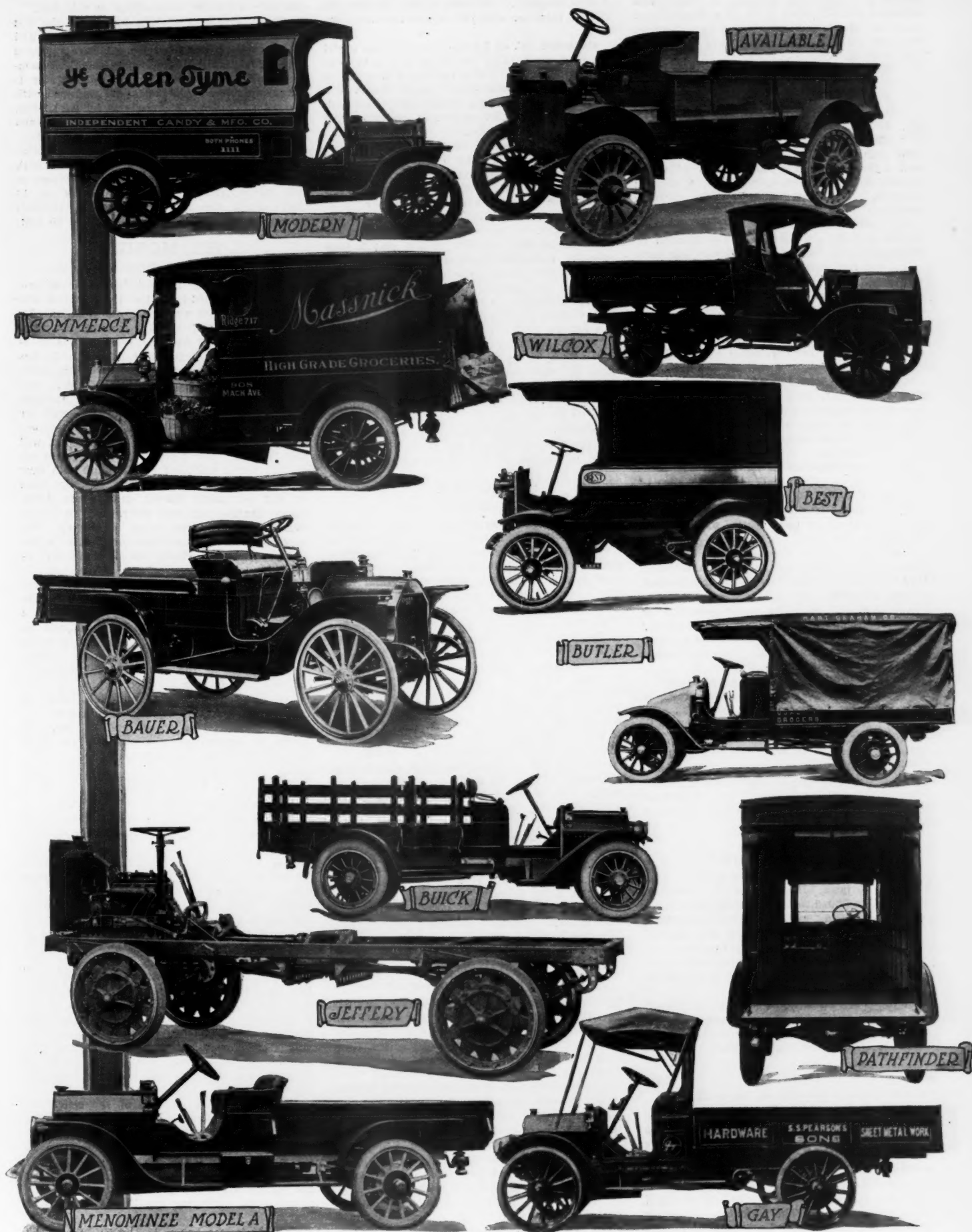
**W**ITH the exception of the addition of a starter and minor mechanical changes, the Great Eagle line of public service vehicles remains unchanged for this year. The United States Carriage Co., Columbus, O., maker of Great Eagle cars, offers casket wagons, hearses and ambulances as well as seven and ten-passenger limousines for funeral purposes. Both a four and a six are in the line. The only difference between the four and the six, the former known as the model A and the latter as model B, is in the cylinder dimensions. Model A has a bore and stroke of 4¼ by 5 inches and





Medium and Light Delivery Cars Designed for Various Businesses





Twelve 1914 Trucks, Showing Variation in Body Designs



model B 4½ by 6¼ inches. A cone clutch selective gearset, shaft drive to a floating rear axle, are the important running gear features common to both. The new Great Eagles use left drive and center control.

### B. A. GRAMM

*Line increased by two models*

**B.** A. GRAMM trucks have been refined for 1914, the 2 and 3½-tonners of last year being continued, with the addition of a new 1-tonner and a 5-tonner, each of which departs somewhat from previous B. A. Gramm practice. These are made by the Gramm-Bernstein Co., Lima, O.

The principal difference between the new models and the old ones is in the location of the motors with respect to the driver's compartment, and the position of the starters and generators. In the old models these are mounted on the gearset, while in the new ones they are under the hood.

The complete line consists of a 1-tonner, a 2-tonner, a 3½-tonner and a 5-tonner. Details on the latter are not obtainable.

The 1-tonner has its Continental 3¾ by 5¼ motor under a hood forward and the driver's seat to the left, with central control levers. A selective gearset is used, and a cone clutch. The truck is fitted with a governor which limits the engine speed to 1,000 r. p. m. or 16 miles per hour.

The 2 and 3½-tonners are practically identical, except as to size. Their motors, also of Continental make, are 4½ by 5½, are located under a hood between the seats, this position permitting the seats to be located directly upon the frame.

The clutch used is a dry-plate multiple disk type, and the gearset a three-speed selective type in which the gears are constantly meshed, change of gear being obtained by means of sliding jaw clutches. The engine governors on these models limit the speed of the truck and engine to 15 miles per hour and 1,100 r. p. m., and 12 miles per hour and 1,100 revolutions per minute, respectively.

The rear springs are perched above the axles. As in all B. A. Gramm models, the frame is quite low.

Such general points as have been decided in regard to the 5-ton model include a 4½ by 5¼ engine governed to 10 miles per hour at 1,000 revolutions per minute, electric lighting and starting, the generator and motor being located beneath the hood, dry-disk clutch, individual clutch gearset, jackshaft foot brakes, and chain drive.

### GAY

*Two models are offered this season*

**G**AY commercial vehicles from the S. G. Gay Co., Ottawa, Ill., consist of model F, which is continued without change and has a capacity of 1 ton, and model G of 1½ tons.

The motor in these models is 3¾ by 5½, cast in pairs and located under the hood. It is furnished with Elsemann fixed-spark single ignition, and a governor on the motor limits the speed to 15 miles per hour.

Drive from the motor is through a leather-faced cone clutch to a three-speed selective gearset, mounted on the jackshaft, from which the drive is taken by double chains.

### G. M. C.

*Four load capacities marketed*

**B**UILT in four capacities by the General Motors Truck Co., Pontiac, Mich., ranging from 1¼ tons to 5 tons, G. M. C. vehicles are built in six models, four of which have their motors under the hood and two of which have the motor under the seat.

They are characterized by the use of chain drive on all models. The motor under-the-seat type is made in 3½ and 5-ton capacities, both models of which are practically identical, except as to strength. Four models are made in the under-the-hood type, of 1¼, 2, 3½, and

5 tons capacity. The two smaller models are almost replicas, and the larger two are similar.

On model VC, of 1¼-ton capacity, and model SC, of 2-ton burden, the motor is 3¾ by 5¼, cast in block, and drives through a cone clutch to the three-speed selective gearset which is a unit with the jackshaft. Final drive is through double chains. Left steer and center control are used on this model.

On model H and K, of 3½ and 5 tons burden, the motor is a 5 by 5 four-cylinder type, cast in pairs, located under the seat. It drives through a disk-in-oil clutch to a three-speed progressive gearset, integral with the jackshaft. Steering and control on this model are to the right.

On model HU and KU, of 3½ and 5 tons capacity, the same motor, clutch and gearsets, but it differs in that the motor is under the hood and that steering is to the left, with the control levers in the center.

Governors are fitted to all models, governing the 1¼-ton at 1,130 r. p. m. or approximately 14 miles per hour; the 2-ton model at 900 revolutions, or 12 miles per hour; the 3½-tonners at 800 revolutions, or 10 miles per hour; and the 5-tonners at 800 revolutions, or 9 miles. Several options are given on wheelbase on all models.

Besides the standard models, a special dumping truck equipped with the G. M. C. patented hoist is carried, in 5 tons capacity.

### GRAMM

*For the Canadian trade*

**C**ANADIAN Gramm trucks are made in three capacities—1, 2 and 3½ tons—and are designed especially for use in the Canadian provinces. The 1-tonner is a continuation from last year's production, while the 2 and 3½-ton models have been somewhat changed from former designs of the Gramm Motor Truck Co., Waterville, Ont.

The 1-ton differs from the larger models in that its motor is inclosed in a hood forward, while in the 2 and 3½-tonners the hood is between the seats. The steering wheel is to the left in this model, with the levers in the center. The motor is 3¾ by 5¼ instead of 4½ by 5½, as on the larger.

The 2 and 3½-ton vehicles are practically identical, except as to principal dimensions. The frame and seat on these models have been improved with a view to increasing accessibility. The motor is located between the seats and under the floor, at the front.

The motor is a Continental, and drives through a leather-faced cone clutch to a three-speed selective gearset of Brown-Lipe make, located amidships, driving to a Timken jackshaft with external brakes outside the sprockets, final drive being by double chain.

All Gramm models are equipped with dual high-tension ignition systems revolving-ball governor, pressed steel frames, and solid tires.

### HORNER

*An old friend under a new name*

**F**ORMERLY the Grabowsky, the Horner truck is a refinement of former design, and now is built by the Detroit-Wyandotte Motor Co., Wyandotte, Mich., in five capacities, from 1 to 5 tons, and follows Grabowsky lines very closely.

The Horner truck is characterized by the use of the French type of hood with the radiator on the dash, by its use of left steer and center control and chain drive.

The complete line consists of a 1-ton, 1¼-ton, 2-ton, 3-ton, and 5-ton, all patterned alike, except as to size and load capacity. Improvements over the Grabowsky models consist of the elimination of the two-cylinder models entirely, standard Continental four-cylinder power plant being employed instead, the dropping of the detachable engine feature, the changing of the hood form to give better appearance, and the lowering of the radiator. Left steer and

center control are innovations in this line.

The motors used are 4½ by 5¼ on the first three models, 4¾ by 5½ on the 3-tonner, and 5¼ by 5¾ on the 5-ton job. All are equipped with dual ignition employing the Mea magneto, with hand advance. The carburetor is hand controlled. All models are equipped with governors limiting the speeds as follows: 1-ton, 19; 1½-ton, 15; 2-ton, 15; 3-ton, 12, and 5-ton, 10 miles per hour.

Multiple disk clutches, three-speed selective gearsets, and chain drive are universal with these models. All models have a wheelbase of 145 inches, affording a turning radius of 40 feet except the 5-ton type whose 156-inch wheelbase affords a turning radius of 45 feet.

### HUPMOBILE

*One chassis and few changes*

**T**HE Hupmobile light delivery car is produced for 1914 by the Hupp Motor Car Co., Detroit, with practically no changes. Its chassis differs only slightly from the 32 touring car produced by this company, as it is primarily intended for fast delivery. It has a capacity of 800 pounds, and a loading space 52½ inches long by 40½ inches wide. The Hupmobile is regularly equipped with a standard light-weight body especially designed for package work, but the chassis unequipped, ready to receive any type of special body, will also be sold. The features of this vehicle are a block motor and unit power plant with four cylinders 3¾ by 5½, with a gasoline tank on the permanent shroud dash, shaft drive, center control and left steer, and an exceptionally low floor and center of gravity. The only improvement that has been made is the addition of the Pierce speed controller as regular equipment.

The motor is equipped with high-tension single ignition, with a hand adjustment on the steering wheel. The throttle is controlled both by a lever on top of the wheel and an accelerator on the floor. The steering wheel is to the right, with the levers in the center. The clutch is of the multiple-disk-in-oil type, inclosed within the flywheel which is contained in the crankcase, and lubricated in conjunction with the engine. The gearset affords selective three speeds and reverse, and drives in approximately a straight line to a three-quarters floating rear axle.

### HEXTER

*Gas-electric vehicle of novel design*

**W**HEN first announced, the Hexter truck, made by the Roland Gas-Electric Vehicle Co., New York, was in one chain-driven model of 3½ tons. For 1914, this model has been altered and now has worm drive to the rear axle, a single motor and differential being employed. Two other models have been added, one of 1½-ton capacity, also worm-driven, and one of 7 tons capacity, chain driven. The 7-tonner, except in weight, size and capacity, is very similar to the first 3½-tonner.

The feature of the Hexter truck is its electric transmission of power. It follows standard lines otherwise, with the exception of the worm drive. The trucks use ordinary gasoline engines, which instead of driving through clutches and gears, drive through electric generators, whose current output is conducted directly to a motor or motors which drive the vehicle.

The transmission consists of the generator, as before said, directly and permanently connected to the crankshaft of the engine. When difficult going is encountered, acceleration of the motor merely serves to increase the current rather than the potential, thereby increasing the torque without any tendency to raise the speed, thus emulating the effect of a lower gear.

The 1½-tonner has a 3¾ by 5¼ Waukesha engine with fixed spark Elsemann magneto. The engine, generator, and motor are suspended on a sub-frame, a propeller shaft being con-



nected to the motor by a universal joint, and drive directly to the rear axle through worm gears.

The 3½-tonner is similar except in point of size and capacity to the 1½-tonner. It has a rolled channel frame, and a Waukesha engine 4¼ by 6¼. On all models, the brakes are all on the rear wheels. Ignition on the 3½-ton size is on the dual plan with automatic advance, the Eisemann magneto being employed.

Except for its final drive and motor size, the 7-tonner is similar in specifications to the 3½-tonner. Instead of driving through a single motor and worm gears, two motors are employed, each of which is geared to half of the divided jackshaft, from which final drive is through chains. The halves of the jackshaft have no connection with one another, thus dispensing with the differential.

Hexter models have no clutch, or substitute for one. They have no gearshift, but instead an electric controller. On the 1½-ton model the governor acts at 18 miles per hour; on the 3½-tonner at 12 miles per hour, and on the 7-ton model at 10 miles per hour.

The motors are in series-parallel and it is said will stand the full output of the generator when stalled stationary, for about 20 minutes before burning out.

Starting may be accomplished in any speed, and it is impossible to start the vehicle with a harmful jerk. This is because it takes a sufficient length of time for the generator to build up its current to eliminate any harshness.

The generator on the 1½ and 3½-tonners is of 7½-kilowatt capacity and that on the 7-tonner of 12 kilowatts. Speed is controlled with the engine accelerator.

## HARVEY

*One 3,000-pound truck offered*

THE 1914 Harvey chassis has the motor under the hood. This motor is of the four-cylinder block type, with dimensions 3¾ by 5½ inches. The drive is by cone clutch to a three-speed selective gearset and then to a jackshaft. Final drive is by side chains. The wheelbase of the car is 130 inches and the tires 36 by 2½ in front and 38 by 4 in the rear. The new Harvey has left drive with center control and is offered with a body length up to 12 feet and a width up to 4 feet 10½ inches. The Harvey is made by the Harvey Motor Truck Works, Harvey, Ill.

## IMP

*Parcelcar in cyclecar garb*

WITH a capacity of 500 pounds, the Imp parcelcar is one of the first cyclecars to be adapted to commercial purposes. It is the same in general construction as the Imp cyclecar, made by the Imp Cyclecar Co., Auburn, Ind., excepting the body, which is a shallow panel type with a place for but one person. The Imp has a wood frame underslung from the wheels by means of double transverse springs secured to the T-shaped spindle shanks to take the place of axles. The motor is mounted under a hood in front. It is mounted on a tubular sub-frame, which also supports the friction change-gear. The jackshaft of this change-gear terminates in belt pulleys, and is located in front of the dash. Long V-belts take the drive to the rear wheels, which are fitted with sheaves. The wheels are of wire, and are equipped with 28 by 2½ clincher pneumatic tires. Steering is accomplished by a horizontal pillar with a hand wheel and rock and pinion, over a gear connected to the steering arms. The Ackerman system of steering is employed. The body, which is made of fiber, consists of an exceptionally long cowl, a low gunwale and a panel top. The load space is 26 inches wide, 26 inches long, and 42 inches high, with double doors in the rear. Access to any part of the load is possible from the driving position. The vehicle has a two-cylinder four-cycle

V-type air-cooled motor. It weighs but 600 pounds and sells for \$395.

## IDEAL

*New gearset in three chassis*

THE three chassis offered by the Ideal Auto Co., Fort Wayne, Ind., are of 1 ton, 1½ and 2½ tons capacity and all these now use a Brown-Lipe gearset in connection with a Continental motor. There has been adopted a floating axle in a jackshaft and an automatic locking differential. Instead of having two jackshaft brakes one is used now which operates on the driveshaft. The 1½-ton truck now is built with the motor under the hood as well as with one under the seat.

## INDIANA

*Continued without radical change*

THE Indiana trucks will be continued another year by the Harwood-Barley Mfg. Co., Marion, Ind., without radical changes or additions. They range in capacity from 1 to 3 tons and are produced in three models, following the same general lines in design. The complete 1914 line consists of a 1-ton, 2-ton and 3-ton vehicle, each of which is practically identical except as to details directly affecting the live load capacity. Changes in design that are manifest in the 1914 series are as follows:

A governor has been installed in all models, being driven from the countershaft of the gearset instead of from the engine, as is the usual practice. Formerly, on some models, some of the jackshafts were of the semi-floating type, but this year they are all floating. The brakes, which are operated by the foot being located on the jackshaft within the frame, and those operated by the hand, on the rear wheels, have all been increased in size. The former right steer and control has also been abandoned, left steer and center control having taken their place.

## I-H-C

*No changes, but minor refinements*

CONTINUING its two models of 1,000-pound commercial vehicles, the International Harvester Co., Chicago, whose motor truck factory is in Akron, O., announces no changes other than minor refinements. Their trucks are styled model MA and MW, signifying, respectively, air-cooling and water-cooling. Both follow the same design other than the method of cooling. Their engines are under the body, and are of the horizontal two-cylinder opposed type. They drive through a disk clutch to a unique type of gearset, affording two speeds forward. The gears are constantly in mesh, and the different speeds are obtained by means of pawls which engage free gears on the mainshaft. Final drive is by double chains.

The control is unusual. There is but one pedal, which controls the service brake. The spark and throttle levers are located on the steering column, and a lever operates the hand brake. The two forward speeds are reverse, are obtained by moving a lever forward and back. The clutch is operated by a secondary lever jointed to the first, and moves vertically. Its movement is so interconnected with the speed-change movement that it is impossible to change the speed without pushing the clutch lever down, thus releasing the clutch. A number of standard bodies are fitted to I-H-C chassis.

## JEFFERY

*New four-wheel drive featured*

BY the addition of the new four-wheel-driven model the line of trucks made by the Thomas B. Jeffery Co., Kenosha, Wis., first introduced a year ago, is increased to three in number. They range in capacity from ¾ ton to 1½ tons. Jeffery trucks are the outgrowth of long experience with passenger vehicles but with the exception of the 1,500-pound

delivery car do not follow passenger vehicle lines.

The light delivery truck follows the lines of the passenger vehicles quite closely, as it is intended to be mounted on pneumatics for fast delivery, meeting conditions quite similar to those encountered by passenger cars. The 1-tonner is chain driven, and is mounted on a truck frame, while the new 1½-tonner is a radical departure not only from passenger vehicle practice but from previous truck practice as well. Its salient features are: Four-wheel-drive by means of double-reduction internal gears, four-wheel steer, four-wheel-brakes, unsymmetric mounting of the power plant, a novel engine inclosure with reference to the driver's cab, left steer and center control, unusual wheels, and many other smaller points of originality.

The truck is built upon a frame of pressed steel channels, of uniform width throughout. Through semi-elliptic springs, this frame is mounted over two I-beam dead axles fitted with the ordinary type of steering knuckles, to which the four wheels are jointed like the front wheels of an ordinary truck, all four wheels being cambered. The wheels themselves are of peculiar form, their hubs being large steel castings to which very short wood spokes are bolted. The small size and length of the spokes make the wheel practically a steel wheel, except that the presence of the wood spokes makes it more flexible than steel. Single tires are fitted.

Within the brake drum of each wheel, teeth are cut. Engaging these teeth are spur pinions supported by the brake drum cover, and through universals, connected with a jackshaft on each axle. The differentials and driving gears of these jackshafts are mounted to the left side of the axle, and driven by a longitudinal driveshaft, which extends forward or back, as the case may be, to a common gearset, located in the exact center of the chassis. The driveshafts are connected to the countershaft of the gearset, which is of the four-speed selective pattern, while the clutch shaft drives the mainshaft of the gearset. Each of the three shafts connected with the gearset is provided with two universals. There are three differentials, one of which is in the gearset, and allows for the different speeds of the two driveshafts, owing to the different axle speeds in rounding curves and in negotiating uneven roads; the other two being in the jackshafts.

The engine is a 3¾ by 5¼ block type, fitted with high-tension Bosch single ignition, hand-advanced, and drives through a novel type of dry-disk clutch.

## KING

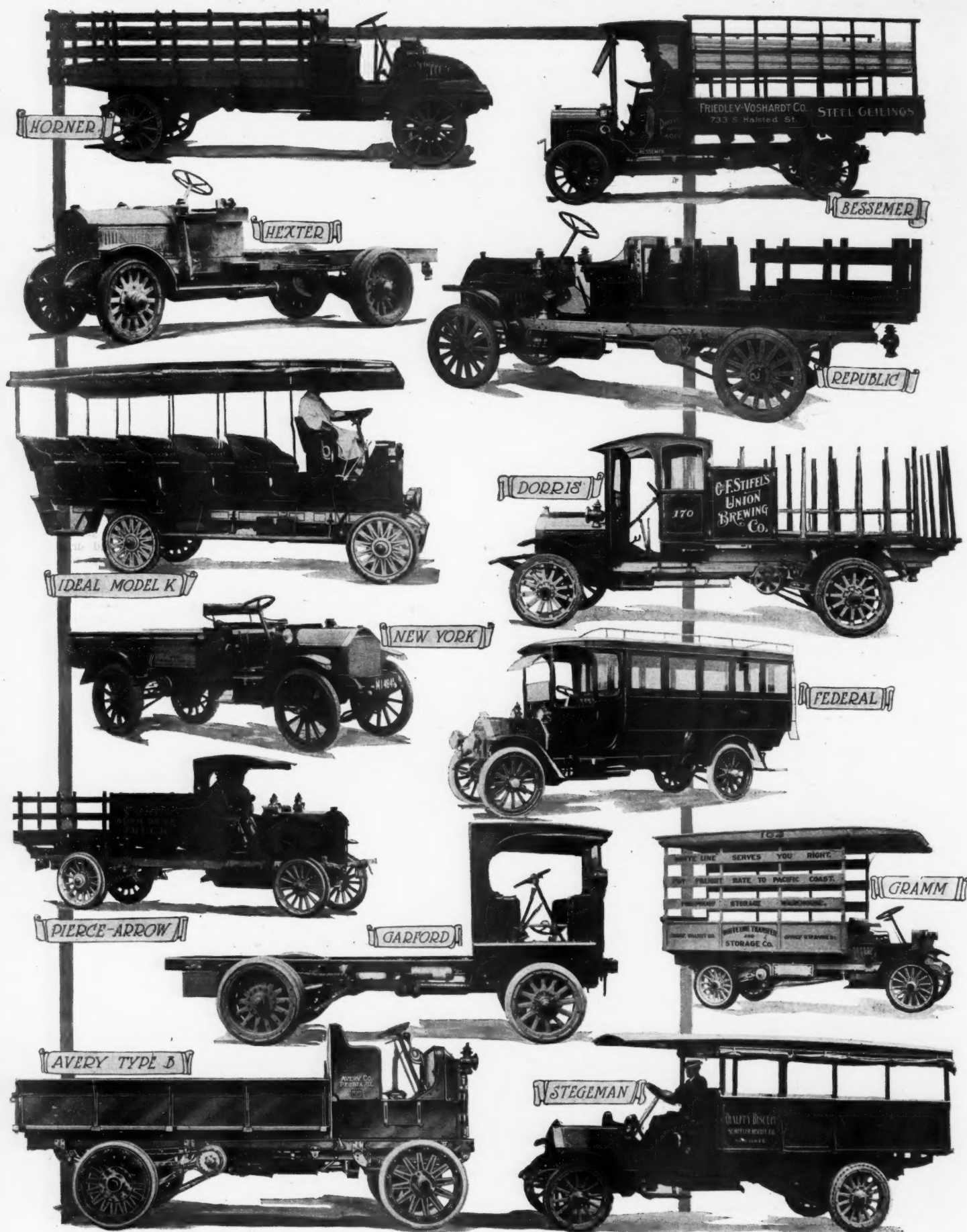
*Several refinements are noted*

CONCENTRATION upon one model is the policy of the A. R. King Mfg. Co., Kingston, N. Y., whose 3½-tonner is continued for 1914 with practically no changes of moment.

Refinements for 1914 consist in an increase in weight of both axles, bronze bushings in the motor, larger tires, the front and dual rear tires being the same size, 36 by 5, the elimination of grease cups in exposed places, such as on spring bolts, self-lubricating magazine bearings being substituted therefor, heavier jackshaft, an increase in the size of the front sprocket to 17 teeth, and minor refinements in the control connections of the clutch and gearset.

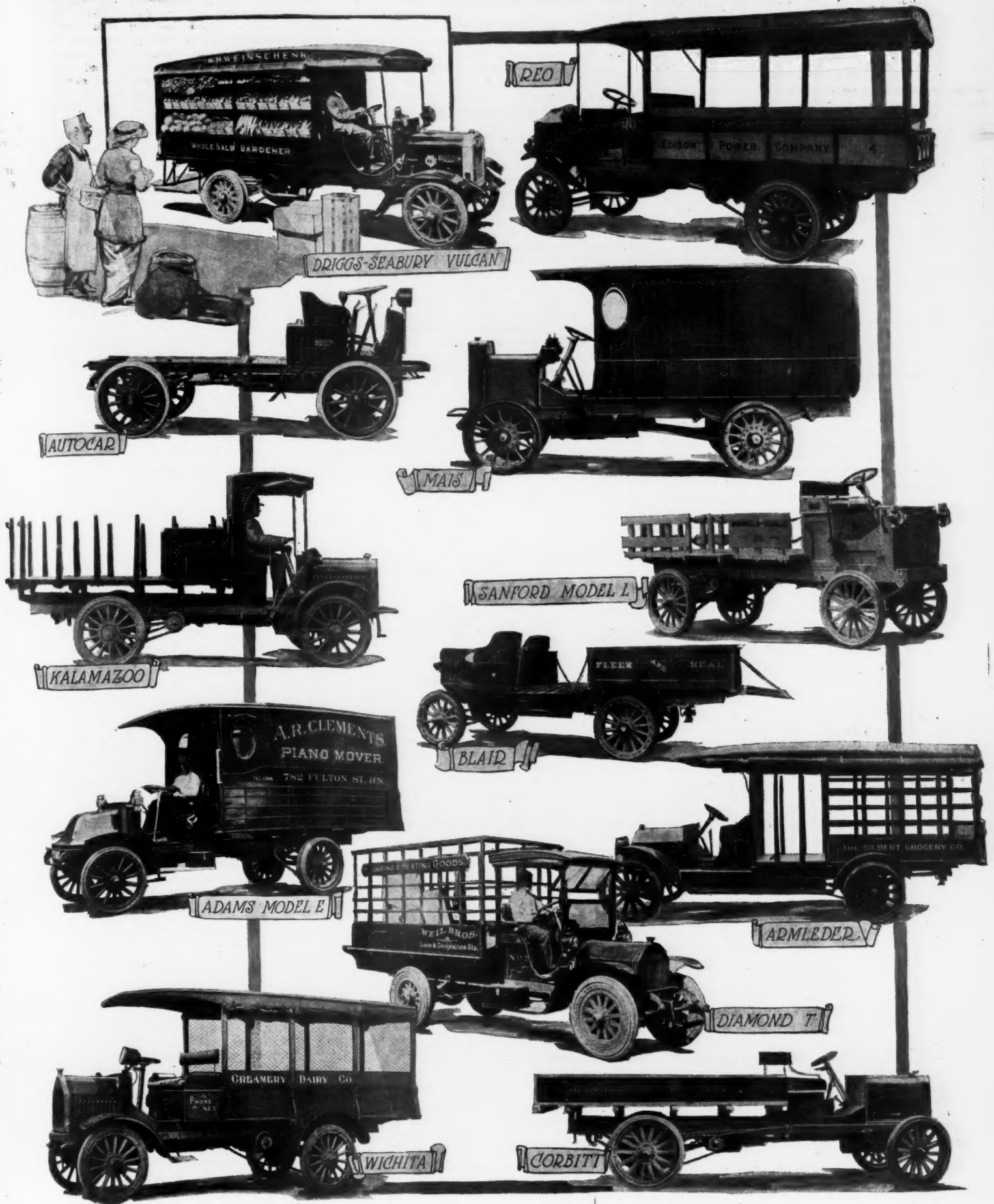
King trucks are fitted with a hand throttle only, the spark advance being fixed, although Bosch dual ignition is employed. They are fitted with governors set to operate at 1,000 r. p. m. or an approximate truck speed of 12 miles per hour. The frame used on King trucks is of rolled channel stock, of the rigid type. Brakes are on the jackshaft and rear wheels respectively, the former being external, located within the frame and operated by the pedal, and the latter internal and hand-operated. The





The Miscellaneous Division—Power Vehicles for All Sorts of Work





Trucks of Medium Capacity, Showing Variety of Body Styles



motor is 4½ by 5½, fitted with a disk-in-oil clutch driving to a gearset incorporated with the jackshaft.

## KALAMAZOO

*More equipment given*

THE 1½-ton Kalamazoo truck made by the Kalamazoo Motor Vehicle Co., Kalamazoo, Mich., appears for 1914 with added equipment. Fenders, a bumper, running boards and a cab now are offered at the reduced price of \$1,590, whereas the former price was \$1,700. The direct drive ratio has been reduced to 9 to 1. The car has a 110-inch wheelbase, uses a four-cylinder motor located under the hood, and drives by cone clutch and selective gearset to side chains. Right drive and right control is retained for 1914.

## KELLY

*Springfield line expanded*

EXPANSION of its line to cover a greater range of applications is the most noteworthy development in the activities of the Kelly-Springfield Motor Truck Co., Springfield, O., for 1914. In addition to its 1 and 3-ton models a 2-ton and a 5-ton model have been added, following the same lines as the other models, the former 3-ton model having been increased in capacity to 3½ tons. This expansion of the offering of the Kelly company goes hand in hand with an increase in output. Practically a 45 per cent increase is expected in the number of trucks to be sold in 1914 over that of 1913. Kelly trucks are adapted to a wide range of applications, from light delivery to heavy trucking.

The Kelly truck is built upon the flexible principle, three-point suspension being used for all principal parts. It is largely manufactured in the Kelly plant. It is not produced in yearly models, but each model follows the same standards, and in general specifications are identical, except as to measurements. From season to season the same models are carried, small refinements being made without reference to time of year.

The complete line for 1914 consists of models K-30, 1 ton, K-35, 2-ton, K-40, 3½-ton, and K-50, 5-ton.

Changes in K-30 and K-40, which have been made and are incorporated in the new models, are of a more or less minor nature, excepting the increase in capacity of K-40, this having necessitated strengthening the component parts.

On the revised model K-40 a wheelbase option of 208 inches has been offered in addition to the 150 and 172-inch options of 1913. In order to lower the load platform of the 3½-tonner, permitting the use of a 4-inch bolster instead of the 9-inch size previously necessitated, the rear tire sizes have been reduced from 42 by 5 dual to 38 by 5 dual.

Pneumatic tires are used on the 1-ton trucks when their speed is likely to exceed 15 miles per hour, in which event 38 by 5½ tires are used all around. This equipment sells for \$200 extra. On the smaller models single or dual rear tires, or sectionals, are optional.

## KISSELKAR

*Six models are in the line*

SIX models comprise the line of the Kissel Motor Car Co., Hartford, Wis., for 1914. These have been somewhat changed from those of 1913, their capacities having been readjusted. Formerly the line consisted of 1,500-pound, 1-ton, 2-ton, 3-ton, 4-ton and 5-ton models. In the new line the capacities have been adjusted to the actual needs of ordinary business, as the Kissel company has found them, instead of in even tons. The result is the continuation of the 1,500-pounder and the 1-tonner, and the substitution of a 1½-ton for the 2-tonner; a 2½-ton for the 3-tonner, a 3½-ton for the 4-tonner, and a 6-ton for the 5-tonner. Each of the models which have new capacities has been redesigned and is to be considered a new model, although following the same lines as its prede-

cessor, excepting the strength of load-carrying portions.

All Kisselkar trucks follow the same lines in design, with the exception of the 1,500-pounder, which has shaft drive. There are two motors in use, that on all models up to and including the 2½-tonner being 4½ by 5½, and that in the two larger models 4½ by 5. All models are fitted with centrifugal governors except the 1,500-pounder.

On the 1,500-pounder the gearset affords three speeds forward, while on the others four speeds are provided. On all but the 1-tonner direct drive is on third. On the 1-tonner it is on fourth. Brakes are all on the rear wheels on the 1,500-pounder, the 1-tonner and the 1½-tonner, and on the others the service brakes are on the jackshaft. Pneumatic tires are regular equipment on the ¾-ton and 1-ton types. Solid tires are optional on the 1-tonner, and cushion tires are optional at extra cost on either.

At extra cost extra length wheelbases and frames will be applied to any of the chain-driven models. Two models of standard bodies are carried for all models, but most of the equipment is special, the Kissel company being well equipped for this sort of work.

## KEARNS

*Single 1,500-pound chassis continued*

SUCCESSOR to the Kearns Motor Car Co., the Kearns Motor Truck Co., Beavertown, Pa., is continuing the single chassis 1,500-pound Kearns truck practically without change for 1914. The new company has abolished its selling branches and instead sells its product direct to the user. The principles back of its design are simplicity and fool-proofness. Accordingly it has a friction drive from a four-cylinder 3¾ by 4 motor located under the hood forward, final drive being by chains. The truck employs high wood wheels with solid tires and right steer and control. It is equipped with a variety of different body styles, and will be provided with special bodies upon order. No governor is fitted on Kearns trucks.

## KOEHLER

*Radical changes have been made*

MARKED changes have been made in the Koehler vehicle for 1914 by the H. J. Koehler Sporting Goods Co., New York city. While in general mechanical makeup the truck is substantially the same as offered a year ago, much of the motor buggy look has been cast off. Formerly 36-inch front wheels and 48-inch rear wheels were employed, but this season the wheels will both be 36 inches high, and will carry the same 2½-inch tires, this uniformity being made possible by lengthening the wheelbase from 85 inches to 90 inches, bringing the rear axle close to the rear end of the vehicle, and distributing the weight equally between the two axles.

The same power plant is employed as formerly was, having a two-cylinder opposed engine under the body, driving by a shaft and bevel gears to the jackshaft and thence by double chains to the rear wheels. The jackshaft is of a novel type, being a cylindrical housing of uniform diameter, within which is mounted the differential, driving gears and the planetary gearset. Left steer and center control are used, the radiator being mounted in place of the dash. The load capacity of the Koehler has been raised from 1,600 pounds to 1 ton.

## KREBS

*Small model using shaft drive*

AMPLIFICATION of the line of the Krebs Commercial Car Co., Clyde, O., has been effected by the addition of a new model, smaller than the previous types and differing from them in that it employs shaft drive instead of chain drive, and is not equipped regularly with the Krebs governor.

For 1914 the four-cycle Continental engine has entirely supplanted the two-cycle engine,

being formerly optional equipment. Although it is no longer listed in the stock models, the Krebs two-cycle engine has not been abandoned because of lack of faith on the part of its makers, but plainly because the popular prejudice against two-cycle engines made the selling cost too high to be profitable. However, for those who prefer the simpler type, a few of these engines which are still on hand will be furnished if specified.

Krebs models range from 1,000 pounds to 1½ tons capacity, and are five in number, comprising four separate capacities. The new model, designated model E, is of ½-ton capacity and greatly resembles model BB, of ¾-ton burden, among the continued models.

The Krebs governor is worthy of special mention. Instead of having a fixed adjustment and merely closing an auxiliary throttle when a certain maximum speed is attained, the Krebs governor is the only means of engine control. Instead of the driver having to constantly adjust his throttle in maintaining a set speed, owing to varying road resistance on hills, in mud, sand, etc., he merely sets his lever in a certain notch on the steering wheel. The governor maintains the engine at this speed, regardless of road conditions, within certain limits, opening the throttle when the truck slows down and closing it when it speeds up. In addition to the throttle control this governor operates upon the spark, also advancing it at high speeds, and retarding it at low speeds.

## LITTLE GIANT

*Twins and fours both used*

TWO models of Little Giant commercial vehicles are continued for 1914 by the Chicago Pneumatic Tool Co., Chicago, Ill., one of 1-ton and the other of 1½-ton capacity. These models are of two cylinders and four cylinders respectively, and for 1914 all models have selective sliding gearsets, the planetary gearset having been abandoned. Little Giant truck parts are principally built in the factory which produces them, and the vehicles are disposed of through direct factory branches. Both types of vehicles are similar in design, having their motors under the floor, chain drive, solid tires and pressed steel frames.

Model F, of 1-ton capacity, has a two-cylinder motor, 5 by 4 inches, with cylinders laid crosswise on the frame, and opposed. The gearset is incorporated with the jackshaft. The steering wheel is upon the right, with the levers at the side. Model H, of 1½ tons capacity, has a four-cylinder motor, 3¾ by 4½, driving through a shaft to the gearset. Its steering wheel is to the left and the levers are in the center.

## KNOX

IN the past the Knox Automobile Co., Springfield, Mass., has done a great deal of specializing on motor, fire and civic equipment, and for this purpose it manufactured a great variety of chassis in capacities from 1 to 5 tons. The development of the Martin tractor, however, has convinced the Knox company that much of this work can be more economically carried on with tractors attached to the old horse equipment, such as fire engines, ladder trucks, etc., and as a result, for 1914, but two capacities of trucks will be built, of 2 and 3 tons capacity, all loads greater than 3 tons being assigned to tractor and trailer equipment, which as yet has not been found as economical for light loads as a self-contained truck, but more so for heavier loads.

The trucks are intended for light trucking, while the Knox-Martin tractor, which is made in two capacities, takes from 4 tons up to the greatest practicable load on any highway—20 tons. The Martin tractor has been developed conservatively, but besides its civic application to fire apparatus, etc., it has been applied to a large number of kinds of commercial service. In principle it consists of a three-wheel tractor carrying the engine and driving means, the front wheel being used for steering, and the



rear wheels for traction. The entire tractor load is carried upon its own springs, unaffected by the load on the trailer. Complementary to the tractor is a two-wheeled trailer, the front end of which rests upon the tractor. The trailer is complete with its own springs and fifth wheel in front, and attaches to the tractor by having its springs bolted to the tractor axle, part of the trailer weight thus being applied to the tractor wheels to secure traction.

The complete 1914 line consists of models R-3, 2-ton truck, M-3, 3-ton truck, model 31, 10-ton tractor, and model 32, 20-ton tractor. All of the other models carried in 1913 have been dropped except as special productions.

The Knox-Martin tractor has been considerably improved for 1914 by moving the cab farther forward, thus giving greater clearance in front of the rear axle for the trailer and permitting more of the trailer weight to be taken by the driving wheels, giving greater traction. Another change has been effected in the rear springs for the purpose of increasing the ease of riding of the tractor.

Wood cabs have been abandoned in favor of the steel type, the new designs being somewhat wider than the previous types, to allow the hood to project farther into the cab.

## LAMBERT

*Friction change-gears featured*

TRUCKS ranging in capacity from 800 pounds to 2 tons are built by the Buckeye Mfg. Co., Anderson, Ind. Noteworthy characteristics of these vehicles are their double chain drives from friction change gears, the position of their motors under forward hoods, and right steer and control. They are intended for delivery and light trucking service, and are continued from 1913 practically without change.

The complete 1914 line consists of five models, of 800 pounds, 1,500 pounds, 2,000 pounds, 3,000 pounds and 4,000 pounds. The first of these two are equipped with  $3\frac{1}{2}$  by  $4\frac{1}{4}$  motors; the third,  $4\frac{1}{8}$  by  $4\frac{1}{2}$ , and the larger two with a  $4\frac{1}{2}$  by 5 motor.

On the 800-pound model the frame is of pressed steel. The vehicle is driven by a single chain direct from the change-gear to a semi-floating live axle, and has both sets of brakes, internal and external, on the rear wheel. The other models all have rolled channel frames and are driven from the change-gear to the jackshaft by a single chain and from the jackshaft to the rear wheels by double chains. All models are equipped with the Lambert friction drive, which consists of an aluminum disk secured to the engine shaft and a fiber-tired wheel or follower so mounted on a shaft perpendicular to the engine shaft that it may be slid from side to side, thereby rolling on the disk at variable distances from its center, thus giving different speeds; if moved to the center of the disk, giving neutral; or to the other side, reverse. The 800-pound and 1,500-pound models are regularly equipped with pneumatic tires, the others being provided with solids.

## LEWIS

*Pacific coast in truck market*

TWO models of trucks manufactured in 1913 are continued by the Lewis Motor Truck Co., San Francisco, Cal. These trucks are intended for the conditions of service to be met on the Pacific coast and are manufactured in the territory to which they are particularly adapted. Although they are made in but two regular models, a special third model is offered. The regular models consist of a  $2\frac{1}{2}$  and 5-ton, the first being of the European type and the second of the American type. The special model is an adaptation of the  $2\frac{1}{2}$ -ton model in which the driver's cab is placed over the motor instead of behind it, increasing the load platform length by about 3 feet and increasing the load capacity to 3 tons. The principal difference in these trucks and those which are made in the east is said to be in their hill-climbing ability and ability to withstand the wear and tear incident to service on the rough roads

which prevail in some portions of the far west. Practically no changes of moment have been made in the Lewis line of trucks for 1914. The  $2\frac{1}{2}$ -ton truck has a  $4\frac{1}{4}$  by 5-inch motor, and the 5-tonner  $4\frac{1}{2}$  by  $5\frac{1}{2}$  size. They are otherwise similar, both having right steer and control.

## LOCOMOBILE

*Single model, a 5-ton, offered*

CONTINUING a single model of 5 tons capacity, the Locomobile Co. of America, Bridgeport, Conn., enters the 1914 market having foresworn none of its past practices. Very few changes have been made in the Locomobile truck; it continues the use of a pressed steel frame; bronze castings instead of cast steel; cast iron, or aluminum, in the motor base; differential case and gearbox; steel wheels; chain drive, chains being inclosed; right steer and control and a differential lock. Among the unusual features of the Locomobile truck are to be mentioned its four-speed gearset, dry disk clutch, which requires only occasional attention for lubrication, interchangeable tires front and rear, two tires of the same size as the front tire being used on each rear wheel, and the differential lock whereby the drive may be transmitted positively to each wheel. Among the refinements in Locomobile construction is a slight change in the specification of steel used in several of the parts.

In the gearset it has been practice to support the shafts and their bearings from the bottom half of the gearbox, the upper half being a detachable cover permitting the removal of the shafts and bearings from above without disturbing the other portions of the chassis.

For 1914 the control of the differential lock will no longer be placed in the driver's compartment as it formerly was in some cases. An interesting improvement on the ignition system consists of a fixed spark double system, in which the magneto circuit and the battery circuit are independent, operating on different spark plugs. The spark on the battery system is only used for starting and in exceedingly difficult places in which the motor speed is too low to generate a spark of sufficient intensity, under which conditions a retarded spark is desirable, and accordingly is set 10 degrees later than the point at which the magneto spark is fixed, the latter being at a point which tests have shown gives the greatest economy in ordinary running. This advance is 19 degrees before top dead center.

The governor is completely incased and protected against abuse of any kind without detection, with the exception of lack of lubrication which has the effect of slowing down the motor and which for this reason is not likely to be practiced by the driver.

Special design of bodies has always been a feature of Locomobile trucks. The interchangeable dump body which was developed something over a year ago by the Locomobile company and which attracted considerable attention at the shows last year is being applied to longer chassis than heretofore and for this reason a change has been made in the dumping and demounting mechanism. The long worm screw running the length of the bed could not be applied to the longer length of chassis, so that in its place has been substituted a long chain passing over sprockets at either end, the mechanism being driven by worm-gears in place of spur-gears as formerly, thus making it self-locking.

## LANGE

FOR light trucking service two models of commercial vehicles substantially identical in design are produced by the Lange Motor Truck Co., Pittsburgh, Pa. Among the unusual features of the Lange truck are shackless springs, castellated nuts on all bolts, and an unusual degree of interchangeability of component parts. The Lange truck is built up of standard parts and is produced in continuous

series instead of in yearly models. A new special model is being prepared for the market, but up to the present time no details have been disclosed. The only change that has been made in Lange trucks during the past year is the substitution of the Connecticut magneto for the make formerly used. The 1-ton truck has a four-cylinder block motor,  $3\frac{1}{4}$  by  $5\frac{1}{4}$ . The 2-ton truck is identical with the lighter model excepting that its motor is  $4\frac{1}{2}$  by  $5\frac{1}{4}$ ; that it is, of course, heavier and larger, and that its wheelbase is 136 inches instead of 125 inches, as on the 1-ton.

## LONGEST

*Three models are continued*

THREE models of Longest motor trucks are continued from the 1913 line by the Longest Bros. Co., Louisville, Ky. All models with the exception of a special coal truck are of the European type with the motor under a hood forward and equipped with right steer and control. The coal truck, which is provided with a four unit compartment dumping body, has its motor under a hood between the seats of the cab. All models are similar in the use of 5 by  $5\frac{1}{4}$ -inch motors with Bosch dual ignition, driving through leather-faced clutches and four-speed selective gearsets integral with the jackshafts from which the final drive is taken by double chains. Longest trucks are built in moderate quantities for local distribution and follow conservative lines in design. The oil governor which was formerly employed on this make of truck has been discontinued. One of the features of the vehicle is an interlocking connection between the hand brake and the clutch whereby the application of the hand brake disengages the clutch. The Longest Bros. have made a specialty of dumping bodies. The trucks are especially adapted in this particular for use in the coal trade.

## LUCK UTILITY

*Texas concern using new features*

THE Luck Utility truck made by the Cleburne Motor Car Co., Cleburne, Tex., represents advanced construction in several particulars. The motor is located under a hood which is between the seats, with the gearset a unit with it, and drives through a shaft to a bevel-driven rear axle. The vehicle is fitted with a pressed steel frame with three-quarters elliptic springs in the rear and half-elliptics in front. It is made in one chassis model, and is intended for light delivery work, having a maximum capacity of 1,000 pounds.

The position of the motor and cab permits an unusually long body for the wheelbase, without obstructing motor accessibility or discommodating the driver. The seats are fully protected in front by the wide dash upon which the radiator is mounted, and by the mudguards, which close the sides. The seat is low and hence easy to get into or out of. The motor is of four cylinders,  $3\frac{1}{2}$  by  $4\frac{1}{4}$ , and drives through a three-speed selective gearset to the driveshaft. This member is inclosed in the torsion tube, which is supported at its forward end on a globe joint. The truck is equipped with either standard or special bodies.

## LIPPARD-STEWART

*Worm-driven model has been added*

AN addition to the line of the Lippard-Stewart Motor Car Co., Buffalo, N. Y., is a  $1\frac{1}{2}$ -ton worm-driven truck. Besides this, the 1,500-pound model is continued with practically no changes except that an option at extra cost of a worm-driven axle is offered.

Pneumatic tires will be provided on either model. On the bevel-driven 1,500-pound model pneumatic tires only are furnished.

Lippard-Stewart trucks are of the European type, the motors being under a French type hood forward of the dash, with the radiator mounted on the dash. Left steer and center control are used on all models. These trucks are mounted on pressed steel frames with



half-elliptic springs front and rear. They employ Continental motors suspended on three points, driving through leather-faced cone clutches to Brown-Lipe three-speed selective gearset, located amidships. Final drive is through shaft and bevel or worm gears. The principal differences between the  $\frac{3}{4}$ -ton and  $1\frac{1}{2}$ -ton models are as follows:

On the  $\frac{3}{4}$ -tonner the motor is  $3\frac{3}{4}$  by  $5\frac{1}{4}$ , and drives through the clutch and gearset to the rear axle through a driveshaft having two universal joints. The rear axle is of the floating pattern wheels with 35 by  $4\frac{1}{2}$  pneumatic tires all around, with option of worm-drive and 34 by  $3\frac{1}{2}$  front and 34 by 4 rear solid tires. Both brakes are located on the rear wheel, the hand brake being of the expanding and the foot brake of the contracting type. The wheelbase of this model is 115 inches or 125 inches on option. It may be turned in a radius of 17 feet.

The  $1\frac{1}{2}$ -ton model employs a  $4\frac{1}{4}$  by  $5\frac{1}{4}$  motor driving from the gearset to the rear axle through a divided propeller shaft. The middle of this shaft is supported by a cross member through a self-aligning bearing, a third universal being located at this point. This is to eliminate the excessive length of free shafting that would otherwise result with the long wheelbase used. The limited length of free shafting back of the intermediate propeller shaft support is so short as to eliminate the whip that would otherwise be present. The tires are 36 by  $3\frac{1}{2}$  in front and 36 by 3 dual in the rear, solid tires being standard. As in the smaller type the hand brakes are internal expanding in the rear wheels, the service brakes contracting on the same drums. Option wheelbases of 145 inches and 158 inches are offered. Only the larger model is equipped with a governor.

Although not regular equipment, Gray & Davis starters will be applied to either model. A change made in the power plant of the Lipard-Stewart consists of the substitution of three-point for four-point motor support.

## LAUTH-JUERGENS

*Old line continued with few changes*

**C**ONTINUED practically without any change, Lauth-Juergens trucks are placed on the 1914 market in four sizes, adapted to all sorts of trucking. The basic principles of design that have always characterized this line of vehicles are still found intact. The motor is placed under the floor and drive is through a clutch and sliding gearset to a jackshaft, and thence to the wheels by double chains. The steering wheel is to the right, with the levers at the side, and the vehicles are built upon a rigid roll stock frame.

They are built partially by parts makers and partially in the Lauth-Juergens factory. The Rutenber motors, with which all models are equipped, drive through a three-plate dry-disk clutch, to selective sliding gearset, mounted integral with the jackshaft. On the 1 and 2-ton models three-speed gearsets are provided, while on the 3 and 5-tonners four-speed gearsets are employed. The brakes on Lauth-Juergens trucks are on the jackshaft and rear wheels, respectively, those on the jackshaft being external and foot-operated, while the rear wheels are expanded by the side lever. Semi-elliptic springs, wood wheels and solid tires are used on all models.

## LIGHT

*Three-wheeler with unique power plant*

**O**F the three-wheeled type, the Light Commercial Car Co., New York, is unique in the form of power plant employed and the method of drive used to the rear wheels. The motor is of two cylinders, four-cycle, and cooled by air, a flywheel fan drawing the air from a screened opening in the side. The seat is placed immediately over the wheel and the aluminum floor is set directly upon the rolled

channel frame. In front of the dash is the metal package box, having doors in the front. Control is by means of handlebars for steering, a grip control of the throttle, and a small lever on the handlebars for the spark. Four pedals on the floor control the change-gear. The change-gear is of the roller type, rings of varying size on the crankshaft and on the rear wheel engaging with one another through adjustable idler rollers. The front axle is of channel steel, and deeply dropped, bringing the frame approximately in line with the centers of the spindles in front. The front springs are semi-elliptic and underslung. In the rear the frame is rigidly connected to the dead rear axle. The vehicle has a capacity of from 600 to 800 pounds and sells for \$450.

## MERCHANT & EVANS TRACTOR

*Front-drive tractors a feature*

**T**RACTORS of a novel type are being manufactured by the Merchant & Evans Co., Philadelphia, Pa. These tractors are the Devon type, which has been experimented with for some time, but not previously placed upon the market. The tractor itself consists of a two-wheeled cart, supported on its own springs. The motor is mounted under a hood forward and under the cab, the gearset and jackshaft behind the axle, and the cab above the wheels, final drive being by chains to the wheels. The axle is dead, and the wheels are not dirigible, but instead the entire tractor turns.

The tractor acts upon and is supported by a two-wheeled trailer which is substantially a wagon without front wheels. The front of this trailer is provided with a fifth wheel, which rests over a king bolt on the frame of the tractor, beneath the driver's seat. In steering, the entire tractor turns on this pivot. Besides brakes on the tractor wheels, a set of ordinary wagon brakes are applied to the wheels of the trailer, and operated by a lever at the driver's side. Dual rubber tires are used on the tractor wheels, while the trailer has steel tires. The single model now made is rated at 4 to 5 tons capacity, and may be turned to a right angle. Various types of trailers are fitted.

## MOGUL

*Five different models of three capacities*

**T**WO 2-ton, one 4-ton and two 6-ton Moguls are offered by the Mogul Motor Truck Co., St. Louis, Mo. The two-tonners have the same motor,  $4\frac{1}{4}$  by  $5\frac{1}{4}$ , the 4-ton has a 5 by  $5\frac{1}{4}$ , and the 6-ton types have a  $5\frac{1}{4}$  by  $5\frac{1}{4}$ . All these are under the seat except that of one of the 2-ton models, which is in a forward bonnet. All models have chain final drive, but differences in certain features of design and in wheelbase are responsible for the listing of two separate models of the same load-carrying ability. One 2-ton has a cone clutch, the other a disk, for instance. One 6-tonner has a 155 wheelbase and the other 188.

## MERCURY

*Stands pat on one model*

**C**ONTINUING its single motor wagon chassis another year the Mercury Mfg. Co., Chicago, announces no changes whatever in its commercial vehicles. This truck is characterized by the two-cylinder motor under the body, air cooling, a planetary gearset and double chain drive to high wheels in the rear. It is mounted on four elliptic springs and has a steel frame. A considerable proportion of parts that go into the make-up of this vehicle is made in the Mercury plant.

In its design, standards have been more or less ignored, its designers having in view the construction of a simple lightweight vehicle adapted to operation by the novice. It has found its principal market in the middle west and has been applied to the business of small merchants and tradesmen generally. The Mer-

cury vehicle is of 1,000 pounds capacity and unlike most vehicles of the present day it is usually sold completely equipped with some form of standard body, of which the Mercury company carries a comprehensive line. The construction of the Mercury truck is semi-flexible and the vehicle is built high from the ground in order to give great clearance on country roads. The use of  $\frac{3}{8}$ -inch front wheels and 40-inch rear wheels is an unusual feature in this size of truck.

The Mercury motor is assembled with its gearset to form a unit power plant. This engine is a special Mercury design and consists of two cylinders horizontally opposed, laid transversely across the frame and suspended directly from the frame by special brackets. It is of the four-cycle, L-head type, its inlet valves being at the tops of the valve pockets automatically actuated and its exhaust valves in the lower sides of the pockets. The flywheel is mounted in front and is cast with fan vanes as a web which, with deep fins cast on the cylinders, provides for aid cooling. Option of magneto or battery ignition in a single system with fixed spark is offered, the magneto being driven by bevel gears from the camshaft at the forward end. The gasoline tank is carried on the front of the dash, assuring gasoline feed on all grades and being readily accessible for refilling.

Standard body types on Mercury trucks include open express bodies and various types of panel bodies, including a completely inclosed type fitted with glazed sliding doors and windows and front access to the load.

## MACK

*Eight different capacities of trucks*

**I**NTERNATIONAL MOTOR CO., New York, still has on the market its comprehensive line of Mack trucks in 1,  $1\frac{1}{2}$ , 2, 3, 5 and  $7\frac{1}{2}$ -ton sizes. These are all chain-driven from jackshafts, while the capacities from 3 to 7 tons are furnished either with the motor under a forward bonnet or under the seat. Those below 3 tons have the motor under the hood only. In design, the International company is acting conservatively, and is therefore making no announcement of any changes in construction at this time. In addition to the Macks this concern markets Saurer trucks in 5 and  $6\frac{1}{2}$ -ton capacities. These have front hoods and chain drive.

## McINTYRE

*Five sizes of trucks listed*

**T**RUCKS of five capacities are manufactured by the W. H. McIntyre Co., Auburn, Ind., ranging in size from 1,000 pounds to 5 tons. All models are chain driven with the exception of the smallest, and all except this model have four-cylinder engines. The complete line consists of a  $\frac{1}{2}$ -ton two-cylinder and a  $\frac{1}{2}$ -ton four-cylinder, which are practically identical with the exception of their power plants, a 1,500-pound motor wagon chassis, a 1,500-pound pneumatic tire chassis and trucks of  $1\frac{1}{2}$ , 3 and 5 tons. The  $\frac{1}{2}$ -ton chassis are equipped with pressed steel frames, semi-elliptic front springs, elliptic rear springs and high wheels front and rear. The four-cylinder motors are  $3\frac{3}{4}$  by  $3\frac{3}{4}$  and both motors are mounted on sub-frames, incorporated with the unit power plant type of disk-in-oil clutch and three-speed selective gearset. These models have final drive through double chains, left steer and motors under the forward bonnet. The 1,500-pound vehicles are of two types, the first having solid tires, the second pneumatics. They have their motors under forward hoods and systems of transmission similar to all other models, their pressed steel frames being mounted on half-elliptics all around. Right steer and control are used on these and the larger models.

Motors on the 1,500-pound trucks are 4 by 5. The 3-ton and 5-ton chassis differ from the 1,500-pound types in that their frames are of structural channel steel, that their motors



are 4½ by 5½, that their starting cranks are of folding pattern, that they are fitted with governors set for 12 miles an hour, that their clutches are of the Brown-Lipe dry plate type, and on the 5-ton truck, that the control levers are placed in the center of the chassis. The McIntyre company supplies a large selection of bodies for its trucks and it is prepared to build bodies to the purchaser's specification on special order.

## MOON

*Two wheelbase lengths offered*

**B**UT one change has been made in the two chassis line of the Joseph W. Moon Buggy Co., St. Louis, Mo., and this has been the adoption of two chassis lengths in the model B, which has a capacity of 3,000 pounds. The model A, the 1,000-pound car, is continued unchanged. Moon trucks are of the under-the-hood type. The small car is shaft-driven, while the 3,000-pound vehicle is of the side-chain type. The small car has a four-cylinder motor of 3½ by 5 inches, and drives by cone clutch and three-speed selective gearset to the rear axle. The wheelbase is 112 inches. The larger car has a motor of 3¾ by 5½ inches and the drive is taken by a cone clutch and then to the gearset, which is a unit with the jackshaft.

## MILLER

*Detail refinements made*

**T**HE 1,200-pound Miller made by the Miller Car Co., Detroit, Mich., appears with detail refinements for 1914. The motor of 3½ by 4 inches bore and stroke remains unchanged. This shaft-driven pneumatic-tired vehicle has left drive, center control, and is equipped with 33 by 4-inch tires all around. The wheelbase is 110 inches.

## MOORE

*Trucks for varying services*

**H**AVING entered the industry in 1913, the Pacific Metal Products Co., Torrance, Cal., makers of Moore trucks continue three types of commercial vehicles for 1914. These vehicles are intended for medium to heavy trucking, arranged in capacities from 2 to 5 tons. The 5-tonner is of the American type with motor under the floor boards and the others have their motors under the hood. Moore trucks are designed for California conditions.

The complete line consists of 2, 3 and 5-ton vehicles. Their motors are fitted with dual ignition controlled by a lever on the steering post, right steer and control being employed on all models. Cone clutches drive to three-speed selective gearsets on all models but the 5-tonner, whose gearset affords four speeds. All gearsets are incorporated with the jackshaft, from which final drive is by double chains. Service brakes, located on the jackshaft, act externally on drums located outside of the sprockets. Hand brakes act internally on the rear wheel drums. Semi-elliptic springs are used on all around and the frames are of rolled channel stock.

## MENOMINEE

*1,500, 2,000 and 3,000-pound models*

**T**HREE new models of 1,500-pound, 2,000-pound and 3,000-pound, respectively, are manufactured by the D. F. Poyer Co., Menominee, Mich. These models supersede others of similar capacity built last year. All Menominee vehicles have their motors under the hood forward with the gearset and the flywheels bolted rigidly to the motor, final drive being through the shaft and bevel gears to the rear axle. All models are regularly equipped with solid tires, but upon special order may be provided with pneumatics. Half-elliptic front springs and platform rear, and right steer and center control are features in all models.

Changes in Menominee trucks are as follows: The method of mounting the engine to the frame has been changed so as to increase the ease with which the power plant may be dis-

mounted from the truck and so that the radiator connections come over, instead of under, the cross member, giving better drainage. The axles have been re-designed, those on the 1 and 1½-ton sizes being of the double reduction type. Two universal joints are used on the drive shafts of all models instead of one as formerly. Radius rods have been lengthened and brake eveners have been improved.

A Hazard unit power plant is employed on the 1,500-pound model and Beaver motors with Muncie gearsets having dry disk clutches are used on the larger two. All tires for 1914 are of the demountable type, pneumatics being furnished on the 1,500-pounder, 34 by 4 all around, at additional cost. On the 1,500-pound model a centrifugal governor operating at 1,300 revolutions a minute is fitted, the larger being ungoverned. Menominee trucks, besides finding a market in the middle west, have been sold to a considerable extent on the Pacific coast.

## MOBILETTE

*Cyclecar for commercial use*

**C**ONVERTED cyclecars are offered by the Woods Mobilette Co., Chicago, for commercial purposes. These vehicles are distinguished by the fact that although a four-cylinder vertical motor is used, and final drive is through a shaft and bevel gears, the vehicle is essentially of the cyclecar type, having a wood frame, narrow tread, air cooling, friction drive, and low seat. It has four wheels of wire, mounted on straight axles, the rear live and the front dead.

Steering is accomplished by turning the wheels on the Ackerman plan. The frame is suspended above the axles by spiral springs of a unique type, the frame being of steel, and necked in to give steering cramp. The tread of the vehicle is but 30 inches, and the seat is mounted directly to the frame, the driver's seat resting upon running boards at either side.

Two styles of commercial bodies are furnished, interchangeable with passenger superstructures. One of these is of the box type, leaving the driving compartment open at both top and sides, and the other a panel type, with a partially inclosed cab. The vehicle has a maximum width of 35 inches and the body has a capacity of 75 cubic inches. The car may be run through the ordinary 36-inch store door.

## MARTIN

*Makes trucks and fire apparatus*

**B**ESIDES two models of fire apparatus the Martin Carriage Works, York, Pa., builds four models of commercial vehicles, the fourth of which, of 1-ton capacity, is a 1914 debutante. This model differs somewhat from the heavier types previously produced. No changes of moment other than minor refinements have been made in the continued models. The principles of construction of Martin trucks in the past have been the use of rolled channel stock in the frame, location of the motor under the floor, right steer and control, and chain drive to the wheels. The new model has a capacity of 1 ton and although it uses heat treated pressed steel frames, two wheelbase options have been offered, 124 and 132 inches, respectively. In this model the motor is under a hood forward and the cab is mounted directly on the frame. The gearset and clutch are bolted rigidly to the motor, making a unit power plant, while in the old models the gearset was a unit with a jackshaft. The engine is a Wisconsin 4 by 5, the clutch a dry plate multiple disk design and the gearset a Brown-Lipe, affording three speeds on the selective plan, final drive being through double chains.

The other models are similar excepting the size of component parts directly affected by the loads carried. They are all equipped with Wisconsin motors, disk clutches, three-speed selective gearsets integral with the jackshafts and double chain drive to the rear wheels. On the 2½-ton and 4-ton models, governors operating at 1,000 r. p. m. are fitted. Solid

tires are fitted to all models and pneumatic tires 35 by 5 front and rear on quick-detachable demountable rims are extra equipment on the new 1-tonner. Bosch double ignition is used on all models and controlled by a lever on the steering column. Bodies for Martin trucks are built on special design only.

## MAIS

*Six models carried by Hoosiers*

**S**IX models of Mais commercial vehicles will be built for 1914, all of which are continuations practically without change from the product of 1913, except for certain improvements in material. Liberal options in dimensions and details of construction of Mais trucks are offered in order to adapt the vehicle to the particular requirements of each buyer. An unusual option is offered in the material of the frame, as on practically every model either pressed steel or channel frames will be supplied. The Mais company builds chassis only, thereby permitting the purchaser to fit any style of body he desires.

The Mais truck is of the European type, and characterized by the unique design of its hood, the radiator being higher than the rest of the hood and backed up by a short air suction chamber with exhaust openings at the sides. All Mais models, though they range in capacities from 1½ tons to 3 tons, are provided with the same motor. This motor is incorporated with the inclosed flywheel and gearset to form a rigid unit power plant.

Left steer with levers also to the left is used on all models. The foot brake operates on the drive shaft in front of the differential and acts externally. Contracting brakes on the rear wheel drums are operated by hand. An unusual feature in trucks is the use of channel steel frames on the 1½-ton model, and pressed steel frames on the four larger.

The complete line consists of two 1½-ton models, two 2-ton models, a 2½-ton model, and a 3-tonner. The difference between the 1½-ton models is in their wheelbases, which is also the principal difference between the two 2-ton models. The 1½-tonners are governed at 15 miles per hour, the 2-tonners at 13 miles per hour, and the 2½-tonner and 3-tonner at 12 miles per hour. Foot throttles will not be applied to Mais trucks. They are fitted with solid tires only. The frame construction of the pressed steel models may be described as semi-flexible, being stiff enough to prevent racking the body and sufficiently flexible to allow for all ordinary road conditions.

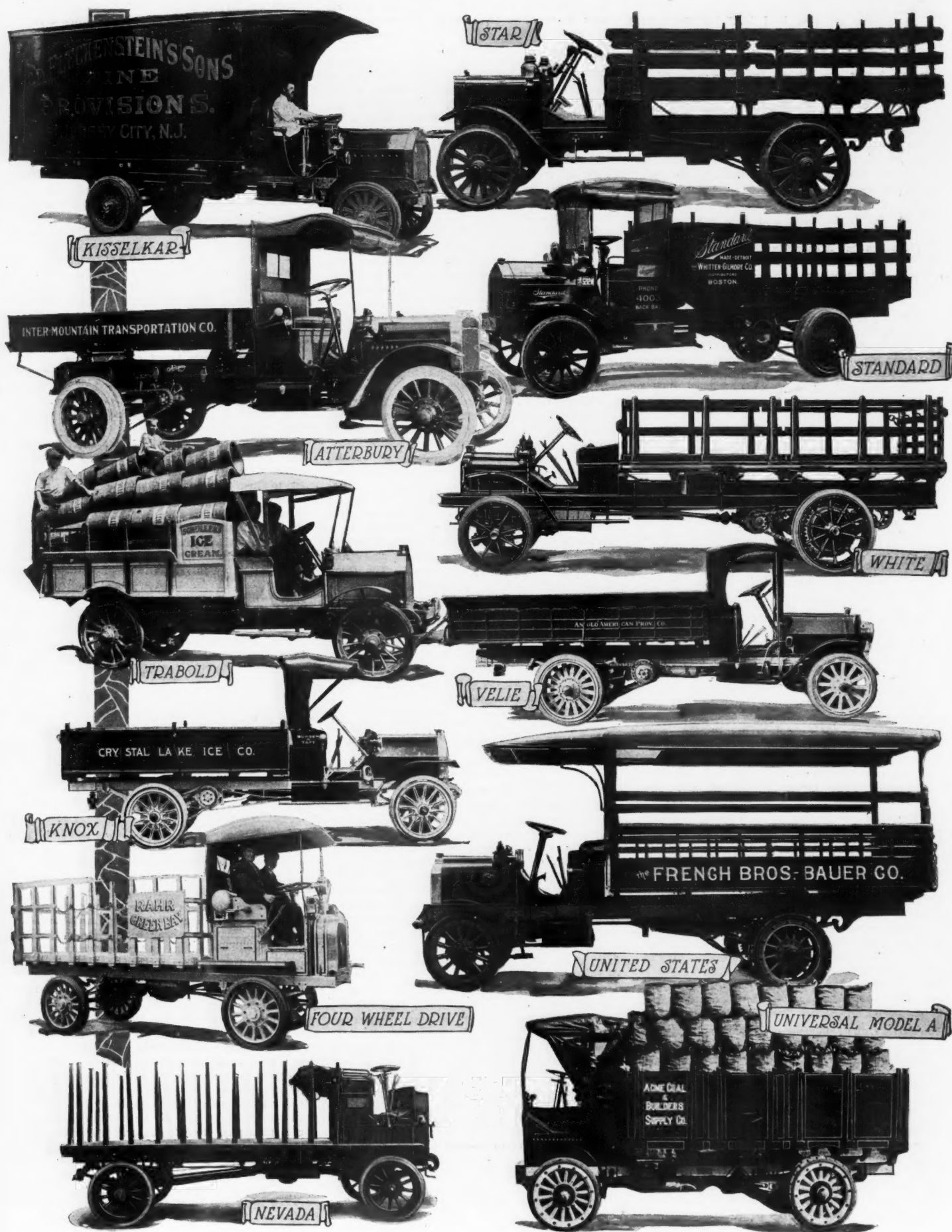
## MARMON

*Light delivery vehicles offered*

**L**IGHT delivery vehicles, built upon adapted passenger car chassis, are again placed upon the commercial vehicle market by the Nurdyke & Marmon Co., Indianapolis, Ind. The Marmon delivery car represents mechanically a vehicle of great refinement and is intended for the service of those to whom first cost is a matter of secondary consideration. In getting up the Marmon delivery car, this company has not been content to simply apply a commercial body to the chassis, but it has gone over each part carefully and wherever it might be better adapted to commercial purposes by change, the change has been made. The motor is a slow-speed, long-stroke type and well adapted to heavy duty on account of its large valves placed on opposite sides. The waterjackets are said to be unusually large for a passenger vehicle motor. For commercial service the engine has been fitted with a centrifugal governor which limits the speed of the truck to 20 miles per hour.

The Marmon truck has its engine under a forward hood and right steer with left control. The motor is supported on three points and inclined to the rear to give a straight line drive. The clutch is an asbestos-fabric-faced cone type and drives to the gearset located amidships. The gearset is a three-speed selective type in-





Big Trucks of Conventional Design, Including Two Four-Wheel Drives





POPE-HARTFORD

POPE-HARTFORD  
5-TON TRUCK



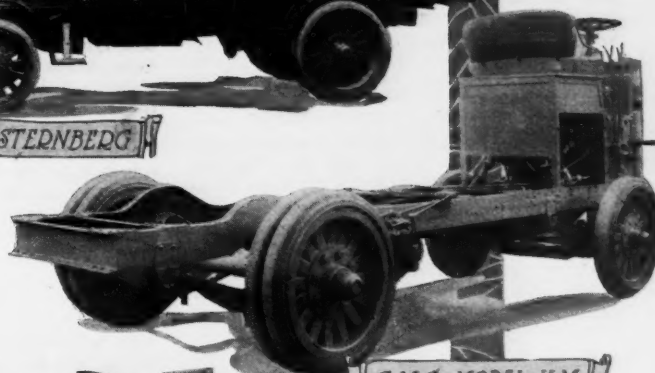
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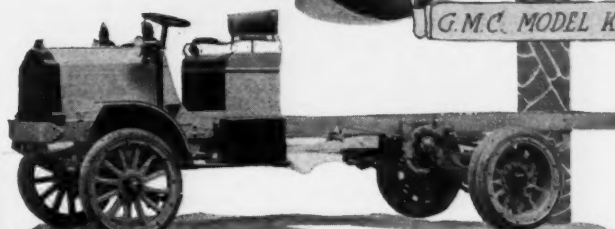


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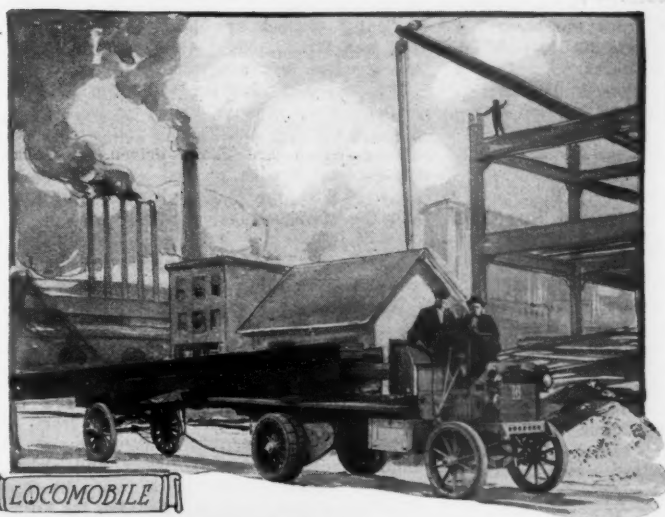
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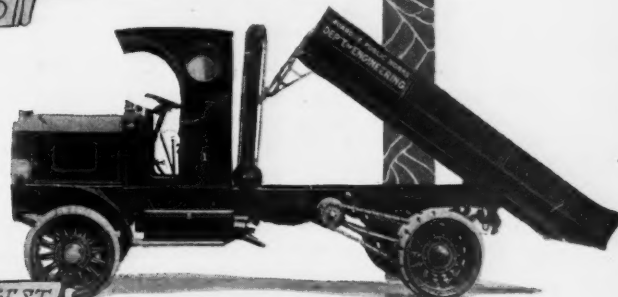
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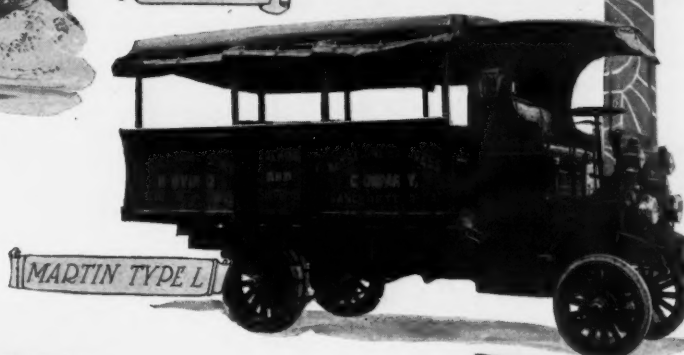
LOCOMOBILE



LONGEST



PEERLESS



MARTIN TYPE L



SPEEDWELL



KING

Heavy-Duty Commercial Cars, Including Dump Bodies and Trailers



tegral with the rear axle, which is bevel driven and of three-quarter floating type. The truck is suspended on semi-elliptics in front and elliptics in the rear. All brakes are in the rear wheels, the two sets being placed side by side, both operating internally. The frame is of pressed steel and torque and propulsion are taken by the torsion arm. Pneumatic tires, single or dual in the rear on option, are standard equipment. Ignition is on the dual plan and all tires are mounted on detachable demountable rims. The Marmon vehicle may be turned in a 40-foot circle.

## MODERN

*New model of 1,500-pound capacity*

**E**XPANDED to three models the line of the Bowling Green Motor Car Co., Bowling Green, O., now embraces capacities from 1,500 pounds to 1½-ton. The new model is of 3,000 pounds' capacity and conforms to the practice in older Modern vehicles. Modern trucks are manufactured for conditions in the middle west, where they find their greatest market.

The complete line consists of a 1,500-pounder, a 1-tonner and a 1½-ton model, all of which have their motors under a forward hood. The motor on the 1,500-pound model is 3½ by 5, on the 1-tonner, 3½ by 5½, and on the new 1½-tonner, 4½ by 5½. All are fitted with cone clutches and drive through selective gearsets mounted integral with the jackshaft and by the double chains to the rear wheels. All models continue left steer and center control. Changes in the 1914 vehicles comprise heavier frames, larger tires and the change to Continental motors. All have wheelbases of 136 inches and; while solid tires are fitted as regular equipment, pneumatics will be provided as special equipment. Modern vehicles are fitted with dual Bosch ignition with hand advance, pressed steel frames, service brakes on the jackshaft, and upon special order will be provided with governors.

## MORTON

*Makes trucks and tractors*

**B**OTH trucks and tractors are manufactured by the Morton Truck and Tractor Co., Inc., Harrisburg, Pa., the former in capacities of 2, 3 and 5 tons, the latter in a capacity of 10 tons. The former have been modified for 1914 by the change from chain drive to worm drive on the rear axle, and the four-wheel-drive tractor has been changed by the substitution of worm-driven axles for the type formerly employed. All Morton vehicles are built with their motors under the floor boards and with optional left or right steer. The Morton company is one of the few who still adhere to steam, the 5- and 10-ton sizes being fitted with high power steam engines in connection with a new type of flash boiler generating system. The 2- and 3-ton sizes are fitted with gasoline engines. All models are fitted with governors which limit the speed of the gasoline engines to 1,500 revolutions per minute.

## MACCARR

*Three models practically unchanged*

**A**DDITION of a 2-ton model constitutes the feature of the announcement of the Maccarr Co., Allentown, Pa. The 1,500-pound, 1-ton, and 1½-ton trucks are continued for 1914 practically without change. The Maccarr vehicle is made in capacities ranging from 1,500 pounds to 2 tons and is intended for delivery purposes and the service of small tradesmen principally. Features in common with all models are motors under the hood, left steer, center control, pressed steel frames, and platform spring suspension in the rear. The new model is practically an enlarged duplicate of the 1½-ton truck.

With the exception of the 1,500-pound model all Maccarrs are similar in the following features: The motor is a four-cylinder block

type, 3½ by 4½, incorporated with the inclosed flywheel and gearset to form a unit power plant. The engine is fitted with a governor set at 1,000 r. p. m., limiting the speed of the 1-ton to 20 miles per hour, and of the 1½-ton to 18 miles per hour. The engine is provided with Bosch high-tension dual ignition with hand adjusted spark. Both hand and foot control of the throttle is provided. The clutch is of the dry disk type so mounted that it may easily be removed without taking down the engine. The gearset is of the three-speed selective type, and drives to a standard jackshaft from which final drive is taken by double chains. The brakes are located internally in the rear wheels and externally on the jackshaft drums outside of the chain and are readily accessible. The rear wheel brakes are operated by the hand lever and the jackshaft brakes by a pedal. Liberal wheelbase options are given on all chassis, three lengths being optional on each, namely, 126 inches, 138 inches or 150 inches.

The 1,500-pound vehicle differs from the larger types in that final drive is through a bevel driven rear axle; standard tire equipment is pneumatic; all brakes are on the rear wheels, and but two wheelbase options are offered, namely, 120 or 132 inches. Pneumatic tires will be applied to the 1-ton truck upon special order. A high degree of interchangeability of parts has been carried out in the four chassis line of the Maccarr company.

The Maccarr company makes a specialty of individual body design adapted to the particular requirements of the truck purchaser. A number of standard bodies are also carried, applicable to various of the Maccarr chassis. A feature of the 1,500-pounder is demountable rims and a spare rim permitting quick tire changes.

## MOTOKART

*Chassis with motor at rear*

**T**HE MOTOKART, made by the Tarrytown Motor Car Co., Inc., New York city, consists of a four-wheeled chassis in which the motor is placed at the rear of the chassis, with the driver's seat over it, the load being carried in an oblong box forward of the dash. It is designed for light loads and quick handling. It is small in size, light in weight, cheap in both first cost and upkeep, and simple in design. The chassis frame is of pressed steel, and is mounted through four semi-elliptic springs upon straight axles having wire wheels. The wheelbase is but 69 inches and the tread 44 inches. The rear axle is a semi-floating single chain driven type, and the front is tubular, with the usual form of Ackerman steering knuckles. Motorcycle tires, 26 by 2½, are used on all four wheels. The motor is of two cylinders, four-cycle, 3½ by 4, water-cooled, and drives by means of a friction change-gear to the rear axle through a short single chain.

The vehicle seats but one person and has a capacity of 400 pounds. The steering wheel is in the center of the car, and the change-speed lever to the right. The gasoline tank is located behind the seat, and the oil tank on the dash. The body, which is of sheet metal, is 51 inches long, 32 inches high, and 32 inches wide. Fully equipped and ready for the road the vehicle sells for \$400.

## MORELAND

*Trucks built for coast service*

**T**HE Moreland truck, made by the Moreland Motor Truck Co., Los Angeles, Cal., is especially designed for use in the particular conditions to be encountered on the Pacific coast. They are made in six models, ranging in capacity from 1,500 pounds to 5 tons.

These trucks are made in two types, the lighter vehicles being of the European type, with the motors under a forward hood and the heavier, with motors under the floor board, or the American type. All models use right steer. Notable among the changes for 1914

are the modifications of capacities, the former 1½-ton being this year 1½-ton; the 2-ton being 2½-ton; the 3-ton being 3½-ton, and the 4 and 6½ tons being dropped. The new models are the 1,500-pound and 1-ton delivery types with the motors under forward hoods.

The principal changes in mechanical construction in the continued models other than modifications of load capacity are as follows: In the 1½-ton truck the frame has been made heavier. The motor has been enlarged from 3½ by 5½ to 4½ by 5½. The Westinghouse lighting and ignition system has been fitted and the change to the Master distillate carburetor has been effected. This carburetor, in connected with the Moreland gasifier, permits the truck to run on distillate, a local California fuel of low price.

The 2½-ton truck also has a heavier frame and its motor has been enlarged from 4½ by 5½ to 4½ by 5½. It has been fitted with the Westinghouse lighting and ignition system and the Master distillate carburetor.

The 3½-ton truck uses a 4½ by 6½ motor instead of the 4½ by 5½ formerly employed. It uses the Westinghouse lighting and ignition system and the Master distillate carburetor.

The 5-tonner has been changed in that the rolled channel steel frame has been abandoned and in conformance with all other Moreland models, pressed steel adopted in its place. The Westinghouse lighting and ignition system has been adopted as has the Master distillate carburetor.

Center control has been installed in the 1½ and 2-ton models, thus conforming with the practice in the new models.

The complete Moreland line for 1914 consists of a 1,500-pound and 1-ton delivery car and 1½-ton, 2½-ton, 3½-ton and 5-ton trucks, all of which are chain driven, electrically lighted, fitted with pressed steel frames and supplied with the Master distillate carburetor and the Moreland gasifier.

## MONITOR

*A 1,500-pound vehicle is added*

**B**Y the addition of a new model of 1,500 pounds' capacity the line of the Monitor Automobile Works, Janesville, Wis., has been expanded to two models, including the continued 1-tonner of last season. The new truck is a considerable departure from the former practice of the Monitor, having its motor under a hood forward and driving through double chains instead of the bevel live axle, formerly employed. Like the former model, it is built for solid tires and is mounted on elliptic springs in the rear. The Monitor truck is made of standard parts and it is intended for use in the middle west. It is built on the series plan instead of by yearly models.

Left drive and center control always have been features of Monitor trucks and are continued on the new model. A feature of unusual interest is a special model which is carried by the Monitor company, in which the cab is divided into two, the right side being given over to a single seat, the steering wheel and control, while the left is an extension of the load platform for use in carrying long material, such as lumber, pipe, etc. The regular model has a four-cylinder Beaver unit power plant, consisting of the motor, the dry disk clutch and a three-speed selective gearset. The motor is located beneath the cab floor and drives by shaft and bevel gears to a semi-floating rear axle. Both sets of brakes are located on the drums of the rear wheels. The new model has a four-cylinder 3½ by 4 Kermath motor included in a unit power plant with a cone clutch and a three-speed selective gearset. Bevels take the drive from the gearset to the jackshaft, which is of unusual construction. Instead of the usual gear differential this jackshaft has two reversible over-running clutches, one next each sprocket, this arrangement giving a positive drive to



the wheel with the greatest resistance at all times. It differs from the earlier model in other respects, such as the location of the seat back of the motor instead of over it, in the form of its radiator, in the fact that the hand brake lever is on the left side instead of in the center of the gear shift lever, and the fact that the foot brake is located on the jackshaft instead of on the rear wheel, as in the shaft drive model. It is regularly equipped with an open express body.

## MORA

*Two-cylinder gives way to four*

HAVING added a four-cylinder motor to its line in the latter part of 1913, the Mora Power Wagon Co., Cleveland, O., enters 1914 without the two-cylinder chassis. The new model is of 1-ton capacity.

The Mora motor was designed especially for commercial vehicle use. It is block cast with valves all on the right side. It is 3% by 5 and designed to develop its power at low speed. It is considerably heavier throughout than the ordinary motor of this size as built for passenger vehicle work. An unusual feature in motors is a two-bearing crankshaft supported on S-K-F self-aligning ball bearings. The motor is suspended direct from the frame on three points and its exposed flywheel is fitted with fan vanes for a web. The valve mechanisms are inclosed and the manifolds are integral. The crankshaft is 2 inches in diameter, which allows a very liberal margin of safety in a motor of but 25 horsepower. The motor is thermo-syphon cooled and has neither fan nor water pump.

From the motor the drive is through a shaft to a planetary gearset incorporated with the jackshaft, from which it is taken by double chains. Other features of the truck which are new to Mora practice are underslung springs in the rear; jackshaft brakes operated by a foot pedal and acting internally on drums positioned between the frame and sprocket; bottle neck frame in front, and larger dimensions throughout. Left steer and center control are retained, and the vehicle is mounted on a pressed steel frame. The Mora company favors pneumatic tires for most classes of service, although full solid equipment will be supplied on special order. A favored arrangement is pneumatic tires in front and solids in the rear.

## NATCO

*No important changes made*

THERE have been no important changes in the Natco 1-ton truck, which is the only capacity made by the National Motor Truck Co., Bay City, Mich. Such alterations as have been made are only in minor details which go to refine the present job. The motor is 3½ by 5, four-cylinder, and the drive is through jackshaft and inclosed side chains. The motor is under the drive seat, and the drive on the left. The wheelbase is 104 inches, and this gives a length of 96 inches back of the seat.

## NEW YORK

*New York City represented*

TEGETMEIER & RIEPE, New York, are in the market with a 3,000-pound truck with New York as its trade name. The car drives from a four-cylinder block 3¾ by 5¼ motor of 30 horsepower back through a three-speed gearset to a jackshaft from which side chains convey the power to the rear. The seat is back of the motor. The wheelbase is 129 inches, the overall length 191 inches, the load space 8½ to 10 feet, and 4 to 6 feet wide.

## NEVADA

*Four-wheel gear-drive truck*

THE NEVADA is a four-wheel gear-drive truck and is made with a capacity rating of 3 tons. The present model is an entirely new job and conveys the power to each of the

wheels through shafts. The driver's seat is over the motor and the steering is on the right. The truck uses a 4½ by 6½ Waukesha motor and also incorporates a Cotta dog clutch gearset in which the gears are always in mesh. The length of the loading platform is 12 feet, maximum, while the width is 40 inches. The Nevada Mfg. Co., Nevada, Ia., is the maker.

## NELSON LEMOON

*Trucks for individual needs*

NELSON LEMOON, Chicago, builds trucks in ¾, 1, 1½, 2, 3 and 5 tons capacity to conform to the individual needs of each customer. Bodies are not furnished. The three smaller models are worm-driven, while the larger types have chain drive. All have the motor under the bonnet and right steering is common to the entire line. The three worm-driven vehicles adhere to the same design throughout. In all these trucks the wheelbase and load space are optional.

## OVERLAND

*Light delivery on pleasure chassis*

BUILT upon its regular model 79 chassis as used for passenger cars, the Overland light delivery, product of the Willys-Overland Co., Toledo, O., makes a speedy vehicle for the delivery use of florists, butchers and the like. This vehicle has a 35-horsepower motor and the power goes by shaft direct to the rear axle, where the gearset is located. The motor is a 4¾ by 4¾ and is under a forward hood. The steering is on the right and control in the center. Wheelbase is 114 inches and the tires 33 by 4 pneumatic.

## O. K.

*Light delivery of 1,200 pounds in two body styles*

A LIGHT delivery of 1,200 pounds capacity is being marketed by the Star-Tribune Motor Sales Co., Detroit, under the name O. K. This is a motor-under-the-hood type. The cylinder dimensions are 3¾ by 4¾ and the rated horsepower 19.6. The drive is by shaft to the rear axle, the gearset being in unit with the engine. The car is fitted with pneumatic tires. Two body types are fitted, an inclosed and an open design. The closed body has a load space 70 by 46 by 52 inches.

## PERFEX

*Thousand-pound delivery vehicle from coast*

THE Perfex is a 1,000-pound delivery vehicle with its engine under the bonnet. It is made by the Perfex Co., Los Angeles, Cal. The design incorporates a 3¾ by 4 motor which drives through direct shaft, cone clutch and three-speed gearset to the rear axle. The wheelbase is 116 inches and the car is mounted on pneumatic tires.

## PATHFINDER

*Pleasure car chassis used*

THE Motor Car Mfg. Co., Indianapolis, Ind., offers a 1,500-pound delivery wagon for 1914 which is the standard Pathfinder chassis fitted with commercial bodies. The only difference between the pleasure car and the truck is the fact that the former has a starter and the latter has not. The motor has a bore and stroke of 4¾ by 5¼, the cylinders are cast in block and the motor drive is taken by a cone clutch to a three-speed selective gearset and then to a floating rear axle. The wheelbase of the car is 120 inches and the tires pneumatic, 35 by 4½ inches all around.

## PACKARD

*Two added, 4 and 6-ton types*

WITHIN the past year the Packard Motor Car Co., Detroit, has added two sizes of trucks to its offering. These are a 4-ton and a 6-ton unit. The line besides these consists of 2-ton, 3-ton and 5-ton types. The only essential change in Packard truck construction

for the current year is the discarding of the former brace rod construction on the 3-ton unit for a new form. The 2-ton unit will shortly be so constructed also. The two latest units conform to standard Packard truck construction throughout.

Motors of the Packards are under a bonnet forward of the driver's seat. The transmission of power is through gears to jackshaft and thence by side chains to the driving wheels. The drive is on the right. Much latitude is given the purchaser in the matter of loading space. Several wheelbases are optional on each unit. The 4-ton, as an example, is provided with 126, 144 and 168-inch wheelbase at the same price, while at a slight additional cost it is furnished with 192-inch wheelbase.

## PEERLESS

*Four models without change*

THE four models of Peerless trucks—3-ton, 4-ton, 5-ton and 6-ton—are continued substantially without changes. But while there have been no mechanical changes in the chassis, they have been adapted by special construction and by altering the length of the frame and the wheelbase to some special types of service. The Peerless truck motor is a 40-horsepower four-cylinder, pair-cast T-head, size 4½ by 6½. This drives back to a jackshaft with which the gearset is combined. Then side chains take the power to the rear wheels. Each truck is listed with a long and short wheelbase, which gives wide body latitude. On the 3-ton, for instance, the wheelbase of 151 inches gives a length back of the drive seat of 126¼ inches, while the 174-inch wheelbase provides 168 inches back of the seat.

## PIERCE-ARROW

*Worm drive a big feature*

PIERCE-ARROW trucks are made in 2-ton and 5-ton units by the Pierce-Arrow Motor Car Co., Buffalo, N. Y. These trucks differ from the conventional design principally in the use of worm drive, with the worm above the gear. Side chains and jackshaft are eliminated, the gearbox being forward. The motor is placed under a hood at the front and the drive back of it, on the right. The 2-ton has a 25-horsepower 4 by 5.5 motor, while the 5-ton is fitted with a 38-horsepower 4.875 by 6. The cylinders are T-head and in pairs. The wheelbase of the 2-ton ranges from 150 to 180 inches, while that of the larger is optional, depending upon the application.

## PALMER-MEYER

*One new model announced*

ONE new chassis has been brought out by the Palmer-Meyer Motor Car Co., St. Louis, Mo. It is of 3,000 pounds capacity, has the motor located under the hood, and in general appearance is similar to the 1-ton brought out a year ago. The motor used on the newcomer is the Continental, of 4¾ by 5¼ inches bore and stroke. The drive is taken by a disk clutch to a Warner three-speed selective gearset. Some special features of the new Palmer-Meyer are the spring construction and the extensive use of babbitt bearings. The springs rest on slides. The new Palmer-Meyer has a 144-inch wheelbase, but any length may be had, at the option of the buyer. The 1-ton chassis remains practically unchanged for 1914.

## PALMER-MOORE

*Choice of water or air-cooling*

WITH either a water-cooled or an air-cooled motor, the Palmer-Moore truck, product of Palmer-Moore Co., Syracuse, N. Y., is made for a capacity of 1,600 pounds only. The water-cooled engine is new, these vehicles being driven by a three-cylinder two-cycle engine exclusively heretofore. The water-cooled type, however, is of the same dimensions, 4 by 4, as the air-cooled, and also of the same two-cycle design. Therefore the two are really interchangeable in the same chassis, the water-cooled engine



requiring a radiator, of course. The truck has a 102-inch wheelbase and employs a jackshaft and side chains. The standard load space back of the seat is 45 by 82 inches.

### POPE-HARTFORD

*Continued in 3 and 5-ton capacities*

**I**N 3 and 5-ton capacities, Pope-Hartford trucks are continued for the current year. The Pope Mfg. Co., Hartford, Conn., is the maker. These trucks both have a 4.75 by 5.5 engine, the heavier truck being geared down lower. The motor is placed either under the seat or under the hood and drives back through shaft to jackshaft and side chains. The steering is on the left and control in the center. The 3-ton has a standard wheelbase of 138½ inches and the 5-ton 140 inches.

### REPUBLIC

*Michigan concern branches out*

**A**LTHOUGH the Alma Motor Truck Co., Alma, Mich., made a 1,500 to 2,000-pound Republic truck heretofore, it is now a 2,000-pound type. This is really an increase in capacity, since the maximum allowable load heretofore is now the normal load. Besides this and making the frame 9 inches longer and increasing the wheelbase 8 inches—it is now supplied either 116 or 124 inches—the Republic has come in for little change. The car incorporates a chain drive and jackshaft, the power being supplied by a 3.75 by 5.25 Continental engine which is forward under a bonnet.

### ROYAL

*Two new vehicles announced*

**T**HIS comparatively recent comer to the field is made in two chassis, a 3½ and 5-ton, and hails from the factory of the Royal Motor Truck Co., New York. With the exception of the wheelbase and price the cars are the same. The 3½-ton has a 132-inch wheelbase and the 5-ton 138-inch. The motor is located under the hood, is a four-cylinder of 4¾ by 5½ inches, has T-head cylinders and water circulation by pump. The main running gear details are a disk clutch, individual clutch gear-set, driving to a jackshaft and side chains to the wheels. Right drive and right control is used.

### REO

*Light delivery and 2-ton truck*

**T**HE Reo Motor Car Co., Lansing, Mich., is in the market with a 1,500-pound light delivery wagon and a 2-ton truck. These are practically continuations from last year, with no material alterations or differences. The light delivery locates its horizontal 4¾ by 6 motor under the driver's seat, with the radiator in front. It has chain final drive from jackshafts. Right drive and right control are express body measures 42 by 72 inches, while stake body is 48 by 84.

The 2-ton truck is also provided with final chain drive from a jackshaft, which gets its power from a 35-horsepower 4 by 4.5 vertical four-cylinder power plant. The standard wheelbase is 130 inches, while 146 is optional. The motor is placed in forward bonnet and this gives room for a 115 by 62 stake body or a 120 by 54 express, or any other type desired.

### G. A. SCHACHT

*Old truck under new name*

**U**PON the failure of the Schacht Motor Car Co. the G. A. Schacht Motor Truck Co. was formed in Cincinnati, employing a design similar to that of the Schacht trucks. But one model of these has been continued, this the 2-ton worm-driven type, upon which small improvements have been made. This model is intended for general trucking in its range, and is so designed that it is claimed to be economical in use as a 1½-tonner. The first of these turned out are to be considered 1914 models, although a few of them have been delivered in 1913.

In design the G. A. Schacht truck follows European lines, the motor being under a hood. The frame is of channel stock, and heavily gusseted. Outstanding features of the chassis are its worm-driven rear axle, with all brakes on the rear drums, left steer and center control.

Changes from the 2-ton Schacht consist of heavier axles, and instead of the complete axle being purchased, as formerly, the company expects to build its own axles in the future, buying the worms complete from outside makers.

The motor is a four-cylinder block type, 4¾ by 5½. Dual ignition with hand advance is fitted, the spark lever and throttle being located beneath the wheel.

### SOWERS

*One capacity made in two styles*

**T**HE 1½-ton truck made by the Sowers Motor Truck Co., Boston, Mass., was a newcomer to the truck field last year. It is made both in motor-under-hood and motor-under-bonnet types and is chain-driven from jackshaft. It uses a 3¾ by 5 Wisconsin block motor. The motor-under-bonnet design has a 140-inch wheelbase, while the other is 120 inches. The length of the loading space in the standard body is 126 inches and the width 72 inches.

### SELDEN

*One-ton model with side chain drive*

**S**ELDEN Motor Vehicle Co., Rochester, makes a 1-ton vehicle of the motor-under-bonnet type having left steer and center control. The motor, a 3¾ by 5½, drives back to jackshaft and side chains. There are two wheelbase lengths to this truck. On the 125-inch length the available load space back of the seat is 102 inches on a frame width of 32 inches. On the 145-inch wheelbase there is 122 inches load space to the rear of the seat.

### STERNBERG

*Adds 7-tonner, making eight capacities*

**T**HE latest addition to the Sternberg array of vehicles is a 7-tonner, which was announced last July. The sizes are 2, 2½, 3, 4, 5, 6 and 7 tons. The 7-ton conforms to the same design features as the older members of the line. All except the 2½-ton have the motor under the seat and chain and jackshaft drive. The 2½-ton is fitted with a forward bonnet and its drive is by a direct shaft and worm gearing, the worm being above. The wheelbase of the four heavy models is 144 inches; that of the 3-ton, 130-160; of the 2½-ton, 148, and of the 2-ton, 116-160.

### SANFORD

*Capacities of 1 ton and 1½ tons offered*

**T**WO models, for capacities of 1 and 1½ tons, comprise the line of the Sanford Motor Truck Co., Syracuse, N. Y. The new models are in general design the same as the 1913 models. They are each about 200 pounds heavier, however, which is largely due to steel and parts of increased diameter to better withstand the road shocks and add to the truck life. In the new editions, castelated nuts and cotter pins have been liberally used, replacing lock washers, as it has been found that even the latter work loose. Both models use a 4 by 4.5 motor, the larger truck being geared down lower than the other. Jackshaft and side-chain construction is used. The 1-ton has a wheelbase of 100 inches, and the 1½-ton, 118. The engine is under the driver's cab.

### SPEEDWELL

*Former practice continued without change*

**S**PEEDWELL trucks for 1914 are the same in every respect as last year and no new models have been added. The capacities are 2, 4 and 6 tons, and the motors of all are located under the seats. The drive is on the left and control in the center. Throughout the design is consistently the same, making use of

jackshafts and side chains. Frames are well braced and lengths are adaptable for different service conditions. The 2-ton is offered in 115-inch wheelbase only, giving 110 inches back of the seat. The 4-ton is 115-inch wheelbase standard, option being given of 139 inches. That of the 6-ton is 139 inches only. Back of the seat to the rear on the 4-ton is 136 inches for the standard wheelbase, while this dimension for the larger truck is 160 inches.

### SUPERIOR

*New 1-tonner offered by Michigan concern*

**O**NE of the most recent additions to the list of 1-ton trucks on the market is the Superior, made by the F. G. Clark Co., Lansing, Mich. This vehicle is a motor-under-bonnet assembly of standard parts, has right steer and control, is chain-driven and fitted with solid tires. A 4¾ by 5½ Rutenber engine is used. The wheelbase of 110 inches allows loading platforms from 105 to 132 inches in length to be used.

### STANLEY

*Two steam vehicles in Stanley program*

**S**TEAM trucks in 1,500 and 2,500 pounds capacity are marketed by the Stanley Motor Carriage Co., Newton, Mass. Neither of these is a new model and the same design features are incorporated in them as are found in the passenger cars of this make. The motors are connected direct to the rear axles, being located directly in front of them. The boilers are placed in front of the dash directly over the front axles. These cars are fitted with pneumatic tires.

### STANDARD

*Three-ton truck sole offering*

**S**TANDARD motor trucks come in 3-ton units and are constructed from parts made by well-known parts makers. The motor is a Continental 4.5 by 5.5, developing 32.4 S.A.E. horsepower. This is located forward under the bonnet and drives back through shaft to jackshaft and thence to side chains. The wheelbase is made optional, the standard being 120 inches, giving a minimum of 123 inches and maximum of 171 inches back of seat. Wheelbases up to 216 inches are listed, with correspondingly greater load spaces. The Standard Motor Truck Co., Detroit, is the maker.

### SERVICE

*New cars on the market*

**T**HE Service Motor Car Co., Wabash, Ind., makes 1½, 2 and 3-ton trucks. These are all entirely new and were recently placed upon the market. All have the motors under the forward bonnet and use left steer and center control. The 1½ and 2-tonners are fitted with a 4.125 by 5.5 engine of 40 horsepower, while the 3-ton has a 45-horsepower 4.25 by 5.5. These cars have chain final drive from jackshaft, and the wheelbases are 145, 150 and 171 inches, respectively.

### SIEBERT

*Single model is continued*

**F**ROM the Shop of Siebert, Toledo, O., emanates a ¾-tonner which is along conventional lines in design. The motor is placed in a forward bonnet and drives back to a jackshaft, which has chains running to the rear wheels. The engine is a 30-horsepower 3.75 by 4.5, of Buda make. Drive is on the left and levers in the center. The wheelbase of 115 inches gives room for an ample body. This car is a continuation and the only change of note is the more accessible location of grease cups. A Mea magneto replaces another make.

### STEWART

*Semi-light vehicle of 1,500 pounds capacity*

**S**TEWART Motor Corp., Buffalo, offers only a 1,500-pound vehicle for semi-light delivery service. This machine has direct shaft drive to the rear axle, and the radiator is placed



back of the motor next to the dash. The seat is back of this. Although there are no new models, several minor changes have been made, the most important of which are the equipping of 34 by 4½ pneumatics on Q. D. demountable rims instead of 34 by 4, and the changing of wood-covered running boards to pressed steel. A foot accelerator is now fitted also. These cars have left steer and the loading space in standard bodies furnished is 84 by 45 inches, along with a height of 60 inches. The motor is a 3.75 by 5.25.

### STEGEMAN

*Five sizes listed by Milwaukeeans*

FIVE capacities are listed by the Stegeman Motor Car Co., Milwaukee. These are a ¾-ton, 1-ton, 2-ton, 3-ton and 4-ton models and all conform to the same general design, except the ¾-ton, which has a shaft drive to the rear instead of chain final drive from a jackshaft which is incorporated in the others. There are three sizes of motors used with these vehicles. The ¾ and 1-tonners have a 3.375 by 5.25, the 2-ton has a 4.125 by 5.25 and the others have a 4.5 by 5.5. All have these power plants under a hood forward of the seat, and the ¾-ton carries pneumatics instead of solid tires.

### STANDARD-CLEVELAND

*Continuation of 1 and 1½-tonners*

THE Standard Motor Truck Co., Cleveland, submits 1 and 1½-ton trucks. These both have the same 4 by 4.5 Hazard motor, which is placed under the bonnet forward. The two chassis are practically the same, except for the larger tire equipment of the greater capacity model and certain frame strengthening to take care of the higher load. In order to accommodate any body requirements the wheelbase of the 1-ton is optionally either 124 or 134 inches, while besides these lengths the 1½-ton also is provided in 144-inch length.

### STAR

*Trucks of 1 and 2-ton capacity*

STAR trucks, product of the Star Motor Truck Co., Ann Arbor, Mich., come in 1-ton and 2-ton units. While there are novelties in this new line, nevertheless there is an intelligent combination of standard parts. The motors are Continentals, the 2-ton having a 4.125 by 5.25, and the smaller a 3.75 by 5.25. They have chain final drive from jackshaft, with which is incorporated Brown-Lipe gearset. The 2-ton has a minimum load length of 128 inches and width of 65 inches.

### STEWART

*Five body styles offered*

STEWART IRON WORKS CO., Cincinnati, O., is offering a 1-ton chassis with a motor under the floor, in five body styles. The motor measures 5 by 5½ inches bore and stroke and drives a disk clutch and two-speed planetary gearset, the final drive being by side chains. The car has a wheelbase of 96 inches, uses 36 by 3-inch solid tires, and has left drive and center control.

### STUDEBAKER

*Light delivery with electric starter*

THE Studebaker Corp., Detroit, has a new light delivery vehicle of 1,500 pounds capacity which supersedes the types heretofore marketed. This new vehicle is equipped with the standard four-cylinder motor as used in the passenger cars of this make, having a bore of 3.5 and a stroke of 5 inches. The drive to the rear is through shaft, and the car has the distinction of being equipped with electric starter and lights. This has been put on to offset the argument of economy in favor of the electric car for frequent-stop service. Another new feature is the location of the gasoline tank on the dash, making quick filling and better carburetor feed possible. The car has left drive

and center control, 106½ wheelbase, and furnished in standard form with either panel or express body. The former has 71 inches back of the driver's seat; 41½ inches width and 50 inches height.

### STEARNS

*No changes in single chassis*

THE single 5-ton chassis made by the F. B. Stearns Co., Cleveland, O., appears unchanged for 1914. The car is offered in two wheelbase lengths, 144 and 180 inches. The motor is a separately-cast four-cylinder affair of 4¾ by 6 inches bore and stroke, is located under the hood and drives through a disk clutch. This in turn transmits the power to a selective gearset located amidships, and thence to side chains to the rear wheels. Left drive and center control are retained for the coming season.

### TIFFIN

*Vehicles of 1,200 pounds and 1-ton capacity*

THE Tiffin Wagon Co., Tiffin, O., which long has been a maker of farm wagons and the like, has entered the truck field with a couple of models—1,200 and 2,000 pounds capacity. They have motors under forward hoods and drive to the rear through jackshafts and silent chains. The lighter vehicle is fitted with a 25-horsepower Buda motor, 3¾ by 4½, while the larger has a Continental 30-horsepower 3¾ by 5½. The wheelbases are 112 for the 1,200-pound and 128 for the 2,000-pound vehicle.

### TRANSIT

*Power plant beneath driver's cab*

MADE in 1, 2, 3½ and 5-ton sizes, the Transit trucks, offered by Transit Motor Truck Co., Louisville, Ky., are assembled from standard parts and are of the type wherein the power plant is beneath the drive cab. They are all made along the same design, having jackshafts and chain drive to the rear wheels, and most other standard features. The two larger sizes give from 14 to 16 feet load space, while the 2-ton affords from 12 to 14 feet and the 1-ton 10 feet 8 inches. The motors are standard Continentals and axles Timken.

### TEEL

*Unchanged car for 1914*

A SINGLE 3-ton chassis is offered for 1914 by the Teel Mfg. Co., Bedford, Mass. The car has a wheelbase of 125 inches and a tread of 63, and has the Continental motor located under the floor. The drive is by disk clutch and a dog clutch gearset to a jackshaft and thence by side chains to the wheels.

### UNIVERSAL

*Five-ton type added to line*

IN addition to continuing its 1½ and 3-ton models, the Universal Motor Truck Co., Detroit, Mich., has added a 5-ton type which conforms to the same general design as that of the 3-ton. It has chain drive from a jackshaft and makes use of a Continental 5 by 5¾ motor. The steer and control is on the right. In the 3 and 5-ton Universal construction the motor is under the seat with the radiator back of it. The 1½-ton is a worm-driven type with the 3¾ by 5¾ engine under a forward hood. Its control is in the center and steer on the left. The only change of importance in the two models which are continued is in the providing of separate pedals for service brake and clutch. Heretofore one pedal operated both.

### UNITED STATES

*Conventional design in 2 and 3-ton capacities*

THE U. S. trucks, product of the U. S. Motor Truck Co., Cincinnati, O., in 2 and 3-ton capacities, are conventional designs with the motor in a forward hood and driving back to the rear through chains and jackshaft. The smaller has a 4¾ by 5¾ engine, and the 3-ton

a 4½ by 5½. The wheelbase of 132 inches on the 2-ton and 144 inches on the 3-ton gives plenty of body room.

### VELIE

*Adds shaft-drive truck of 1-ton capacity*

BESIDES carrying through its 2-ton and 3-ton trucks as previously built, the Velie Motor Vehicle Co., Moline, Ill., has a new model of 1-ton capacity. This truck departs from the transmission construction of the older models in that the drive is by shaft to the rear axle instead of by the use of a jackshaft and side chains. It has a 4¾ by 5¾ engine which is under a bonnet forward of the driver's seat. Left control and center steer are incorporated. The car is fitted with pneumatics and the maximum body length is 129 inches, the wheelbase being 120 also. The larger trucks, both of which have a 4½ by 5½ motor under a bonnet, are furnished in two wheelbase lengths, 148 and 172 inches. The only change in them is the fitting of an auxiliary cross spring to take care of the swaying of topheavy bodies or the sudden action of an overload under shock.

### VULCAN

*Size different sizes are offered*

A COMPREHENSIVE line of trucks is made by the Driggs-Seabury Ordnance Corp., Sharon, Pa., and in these, which go under the trade name of Vulcan, no changes whatever have been made for the current year. The capacity ratings are 2, 3, 4, 4½, 5 and 7 tons, and the wheelbases to correspond are 144, 150, 162, 162, 162 and 156. The motor, which is a 4¾ by 5½ for all models save the 7-ton, which has a 4¾ by 5½, is placed forward under a hood. The drive of all is by jackshaft and side chains.

### WAGENHALS

*New electric three-wheeler is announced*

THE Wagenhals Motor Co., Detroit, Mich., has long been an exponent of the three-wheeler for light delivery work. The car has a capacity of about 800 pounds, and the load-carrying part is forward of the driver's seat. Two wheels with a tread of 58 inches are placed at the front and one at the rear. These are mounted on a triangular main frame from which a sub-frame carrying the body, power plant and seat are suspended by four half-elliptics. The motor is mounted transversely just forward of the drive seats and drives through a planetary gearset to a single chain which propels the rear wheel. The front wheels do the steering. The wheelbase is 80 inches.

The Wagenhals Motor Co. has a new electric car out for test. The general plan of the truck is the same as its standard three-wheeler. The energy is furnished by the General Electric Co. motor by a twenty-four-cell Exide battery. The carrying capacity is 800 pounds and it is to sell for \$790, which is \$100 more than the gasoline car.

### WHITE STAR

*Trucks of four capacities are starred*

THE White Star is a Brooklyn, N. Y., machine, made by the White Star Motor Truck Co. The 2, 3 and 5-ton models are continued without much change, while the 1-ton, which was formerly a stock model, is now only made on special order. These have right drive and control.

### WILCOX

*Motor alongside of driver's seat*

ONE, 2 and 3-ton trucks are built by H. E. Wilcox Motor Car Co., Minneapolis. The two larger models are of the type wherein the motor is alongside of the driver's seat, the drive being on the right. It drives by shaft back to the jackshaft, where the gearset is also located. Then chains take the power to the wheels. To be in line with the engine the propeller shaft and differential are somewhat offset from the center. The 1-ton job has its



engine in a forward bonnet, though retaining the jackshaft construction. Motors are  $4\frac{1}{2}$  by  $5\frac{1}{4}$ ,  $4\frac{1}{2}$  by  $4\frac{1}{2}$  and  $4\frac{1}{2}$  by 5, respectively, and corresponding wheelbases are 124, 118 and 128. The body equipment is special.

### WALTER

*Front-wheel-drive and conventional type offered*

FOR the current year the Walter Motor Truck Co., New York, will push the front-wheel-drive models which it introduced to this country about a year ago and which are constructed along the lines of the Latil, a French machine. But to meet the demand of purchasers who do not want the front-drive type, the Walter company also markets a comprehensive line of conventionally driven trucks with jackshafts and side chains. These are offered in  $1\frac{1}{2}$ , 2, 3,  $3\frac{1}{2}$ , 5 and 6-ton load capacities, while the front-wheel drives are in 3, 4, 5, 6 and  $7\frac{1}{2}$ -ton sizes. All Walter trucks have the motor under a forward bonnet.

### WITT-WILL

*Only changes are detail refinements*

WITT-WILL CO., Washington, D. C., have 1, 2 and 40-ton trucks on the market. Changes for the current year are refinements only. These trucks conform to the same general design, with the engines under the driver's seats and using side chains from jackshafts. The engines are all standard Continentals, the 1-ton having a  $3\frac{3}{4}$  by  $5\frac{1}{4}$ , the 2-ton a  $4\frac{1}{2}$  by  $5\frac{1}{4}$  and the 4-ton a  $4\frac{1}{2}$  by  $5\frac{1}{2}$ .

### WADE

*Single chassis from new concern*

THIS is the only single-cylinder car on the market for 1914, and is practically a new-comer to the field. The motor is air-cooled, of the four-cycle type, and has a stroke of 4 by 6 inches. The intake valves of this

motor are of the automatic type, while the exhausts are of the conventional mechanical. The drive from the motor on the Wade is unique. Two clutches are used and the drive is direct on both first and second. The speed gears are mounted on a jackshaft and are in mesh with smaller gears on friction disk shafts. No differential of the gear type is used, but instead a friction layout is adopted. The Wade has a wheelbase of 76 inches, is fitted with 36 by 2-inch tires all around, and is capable of carrying an 800-pound load. The Wade is made by the Wade Commercial Car Co., Holly, Mich.

### WILLET

*Same two models with new engines*

THE Willet Engine and Truck Co., Buffalo, is in the field with its same two trucks as last year. They are a 1,500-pound and a 2-ton type. These are changed in that they now are fitted with Continental engines instead of those of the Willet make. The sizes are  $3\frac{3}{4}$  by  $5\frac{1}{4}$  for the 1,500-pound car and  $4\frac{1}{2}$  by  $5\frac{1}{2}$  for the 2-ton vehicle. The lighter model has a drive-shaft to the rear axle, while the 2-ton is of the jackshaft type. The wheelbase of the former is 125 inches, while that of the latter is 144 standard and 168 special. These vehicles have their engines in forward hoods, which have sloping fronts.

### WICHITA

*A  $3\frac{1}{2}$ -ton model added to line*

TO its 1 and 2-ton trucks, the Wichita Falls Motor Co., Wichita Falls, Tex., has added a  $3\frac{1}{2}$ -ton model. This conforms to the general design of all of these cars, which have their motor placed forward under a bonnet and drive back through a propeller shaft to a jackshaft and thence by chains to the rear wheels. Each of these cars is fitted with a different engine. The 1-ton has a 3.25 by 5, the 2-ton a 3.5 by 5 and the  $3\frac{1}{2}$ -ton a  $4\frac{1}{2}$  by 6 $\frac{1}{2}$ . It

will be noted that the new vehicle has a specially long-stroke motor. On the 2-ton a frame with 5-inch pressed steel channels has replaced one with 4-inch channels, while the new  $3\frac{1}{2}$ -ton has left drive. The others have right steering, although all include center control. Wheelbases are 110, 118 and 162 inches respectively.

### WHITE

*All models are now left-drive*

WHITE TRUCKS are four in number, and the line comprises no new models for the year 1914. Their ratings are 1,500 pounds, 3,000 pounds, 3 tons and 5 tons. While the 5-ton was the only model previously fitted with left drive, all cars for the current year are now steered from the left. In all models the motor is placed under the bonnet. The smaller two, which as well as the 3-ton have a  $3\frac{3}{4}$  by  $5\frac{1}{2}$  engine, are driven by direct shaft and bevel gears, while the 3 and 5-ton types have jackshafts and side chains. The 5-ton is equipped with a  $4\frac{1}{2}$  by  $5\frac{1}{2}$  motor. Pneumatic tires are a part of the equipment of the 1,500 and 3,000-pound jobs also. The wheelbases are 133 $\frac{1}{2}$ , 145 $\frac{1}{2}$ , 163 and 165 inches respectively.

### WILLYS-UTILITY

*A light delivery of 1,500 pounds capacity*

THE Willys-Utility, which is being made by Willys-Overland Co. at Lima, O., is a new-comer in the truck field within the last year, although a model was exhibited at last year's truck show. It is a light delivery of 1,500 pounds capacity. The car has a 30-horsepower engine,  $4\frac{1}{2}$  by  $4\frac{1}{2}$  inches, in a forward bonnet. Its power goes to a jackshaft and thence to the wheels by chains. The wheelbase is 120 inches and this gives room for a standard express body loading space of 84 by 48 inches. Pneumatics, size 34 by 4, are fitted to the front wheels, while 36 by  $3\frac{1}{2}$  solids are used on the rear.

## Accessories for the Commercial Vehicle Are Many

### Speed-Recording Instruments in Greater Use—Cushion Wheels Attract New Makers

COMMERCIAL car accessory makers have increased in number during the past year have brought out new devices and have improved upon the old ones. The introduction of fenders for trucks has been the most important movement of the year and in many cities the law makes the use of fenders compulsory. Chicago is the latest to issue warning to motor truck owners to equip with fenders. Hubodometers are in greater use than ever before and recording instruments which tell the time of arrival and departure of the car are to be seen on a great many vehicles. Cushion wheels, although claiming a large manufacturing following, have not been taken up seriously by truck makers, but a number of private owners have substituted these devices for the regular wheels supplied. Governors are used on more trucks this year than ever before and one new type has been introduced which governs the speed of the incoming gas. Many governors now are made to control the car speed rather than the motor speed.

Truck tires and tire accessories always are being given much attention and each year the cushions for commercial cars are brought to a higher standard of efficiency.

past year have brought out new devices and Prices are somewhat lower than they were a year ago and in general the accessories are better in construction.

**Kramer Governor**—A novel type of motor governor for trucks has been brought out by the B. G. Kramer Co., Milwaukee, Wis., which does its work by controlling the velocity of the incoming gas. It consists essentially of a throttle attached to a disk which floats in a tapered conduit. It is permitted to float under constant

spring tension which determines the maximum motor speed. With an increase in engine speed the speed of the gas increases and in this way the position of the disk is affected. Any movement of the disk causes a corresponding movement of the throttle and hence when the motor tends to operate rapidly and cause great velocity of the incoming gas, racing is prevented by the closing of the throttle. The governor is set for a maximum of 1,000 r. p. m. when it leaves the factory. The Kramer is shown in cross-section in Fig. 2.

**Transimeter Hubodometer**—A special feature of the Transimeter, a hubodometer marketed by the Transimeters Co., New York, is that it records mileage both on forward speeds and reverse. This hubodometer is built especially for commercial cars, being made of sturdy material and heavy enough to withstand excessive abuse. The maker claims it to be collision proof, waterproof and oilproof. The casings are made of either steel or bronze and  $\frac{3}{8}$  inch thick on one model and  $\frac{1}{4}$  inch thick on another.

An added feature of this instrument is that the dials remain stationary always, so that they may be read easily. The odom-



FIG. 1—STEWART HUBODOMETER FOR TRUCKS



eter shown in Fig 4 registers up to 9999.9 miles and then repeats. Its simple construction and clean cut appearance are features.

**Stewart Hubodometer**—Positive-driving, sturdiness of construction, and immunity to water and mud are the chief features of the Stewart hubodometer brought out by the Stewart-Warner Speedometer Corp., Chicago. This instrument as with all of its kinds is designed to be placed in the hub of the vehicle and its work consists of registering the mileage travelled up to 100,000 and then it repeats. The drive consists of steel pinions with worm and helical gears. The registering dials are locked except at the instant of registering. This hubodometer, shown in Fig. 1, requires the installation of a special hub.

**Coastometer**—The Coastometer is the product of the Rich-Lindemann Mfg. Co., New York, and its installation on electric vehicles of any type enables the owner to ascertain just how many miles have been run under power and off power. Two readings are given by this instrument, one the total miles run by the vehicle and the other the number of miles coasted. The difference between the two readings gives the number of miles operated under power.

The Coastometer is driven from the front wheel of the vehicle by gears. It consists of a cylindrical shell in which the indicating mechanism operates. Also contained in this shell is a small magnetic latch which controls the coasting mechanism. This magnet is connected in parallel with the controller of the truck through the leads coming from the instrument, and con-



FIG. 3—THREE TYPES OF CUSHION WHEELS FOR TRUCKS

From left to right, the Keller, Sewell and Coats

nected to a steel box, which contains a resistance together with two fuses. The box is then connected in parallel with the controller circuit by means of the two wires. When the current is off the controller circuit, the coastometer circuit also has no current and the latch loses its magnetism, thereby releasing the coastometer mechanism, which then begins to register. The reading may be seen on the bottom row of the instrument which is shown in Fig. 4.

**Auto Life-Saving Fender**—The Auto Life Saving Fender Co., Brooklyn, N. Y., markets an automatic fender which is operated when the machine is traveling at a rate of speed of three miles an hour or over. Anyone coming in contact with either the upper or lower rail, both of which are arranged to yield under slight pressure, causes the bottom of the fender, which is flexible, to shoot forward along the ground. The front edge of the fender

is provided with a reversible shoe, or obstacle rider which rides over any projecting stone or car track.

**Never-Mire Jack**—A jack which is said to help a truck out of a hole without any effort on the part of the driven except for attachment, is the Never-Mire, shown in Fig. 5, and manufactured by the Parish-Ferrell Mfg. Co., Harrisburg, Pa. The turning of the rear wheel to which it is attached makes the car move forward, and as will be noted from the illustration the wheel literally climbs on the rack which is part of the device.

**Coronet Hubodometer**—Operated by gravity the Coronet hubodometer manufactured by F. Baumgaertner, Cleveland, O., has no outside connection whatever. The instrument is self-contained and when placed in the hub of the car records mileage both forward and backward. A side view of the Coronet in the hub is shown in Fig. 4. This odometer is adaptable to any type of vehicle.

**Coats Resilient Wheel**—This wheel, shown in Fig. 3 is composed of an outer hard rubber tire on a standard rim with six small pneumatic cushions inside, each cushion being inclosed in a steel rim. The steel rims around the cushions serve as spokes. Free movement of the axle and hub is offered by a space in the center of the wheel. The total volume of air in the six cushions equals that in a 36 by 7-inch tire. To prevent injury to the rubber and fabric of the cushions from heat, light and water, they are inclosed. It is claimed that the Coats wheel not only prevents shock to the driver and car mechanism but also sticks to the ground and thus saves wear on the tire, and further affords protection against blowouts, etc. Low cost and maintenance, and the fact that it saves fuel are other features claimed by the maker, the American Motor Wheel Co., Crawfordsville, Ind.

**Commercial Fender**—With many cities requiring the use of safety fenders for motor trucks a number of makers have been attracted to the field, the latest being the Automobile Fender Equipment Co., Chicago, which calls its product the Commercial fender. This fender, shown in Fig 5, weighs about 50 pounds, is easily installed and removed and is claimed to prevent the wheels of a truck passing over a man in the event one is struck. Crank-

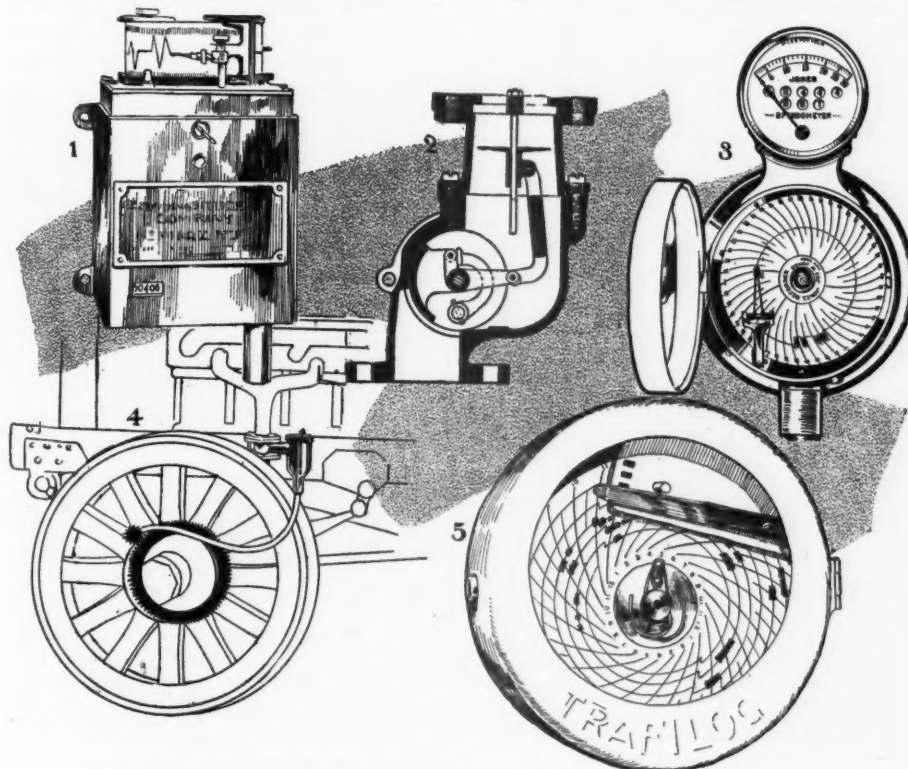


FIG. 2—SOME USEFUL COMMERCIAL CAR ACCESSORIES

1—Speedograph, a recording speedometer; 2—Kramer governor, which controls the speed of the incoming gas; 3—Jones recording speedometer which has unusual features; 4—Pierce speed controller and method of attachment; 5—Traflog which depends upon vibration for recording starts, stops, etc.



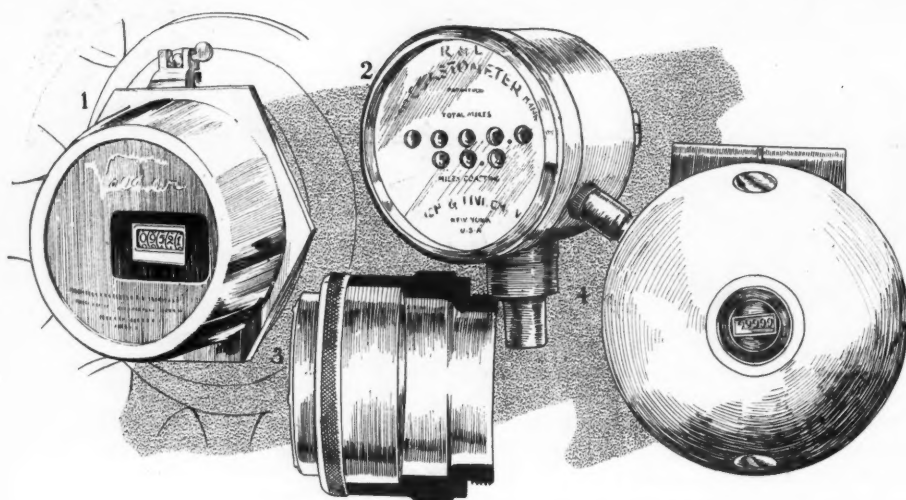


FIG. 4—FOUR TYPES OF HUBODOMETERS

1—Veeder, a clean cut instrument which is attached easily; 2—Coastometer, an efficiency device for electric trucks; 3—Side view of the Coronet, showing its installation in the hub; 4—A newcomer to the field, the Transimeter

ing of the car is not interfered with. The Commercial is made of seamless steel tubing and malleable iron castings and is claimed by the maker to be exceedingly strong for its weight.

**Pierce Speed Controller**—The owner of a truck may limit the speed of his car by using the controlled shown in Fig. 2 offered by the Pierce Speed Controller Co., Anderson, Ind. It is attached to the intake manifold, where a butterfly valve throttles the mixture as the car speed is increased. The controller drive is through a flexible shaft from the front wheel, and it is this feature which distinguishes it from motor governors that are driven by the motor and therefore limit the motor speed rather than car speed. The maximum speed is easily varied by unlocking the cover. The controller mechanism consists of a centrifugal governor whose weights fly out as the speed increases. This raises a vertical rod operating a rack and pinion and closing the butterfly valve located in the intake pipe.

**Speedograph**—The Recording Speedometer Co., Newark, N. J., is marketing an instrument known as the Speedograph, illustrated in Fig. 2, which tells the owner of a truck the arrival and departure of his vehicle from various points, the length of time made for stops, the total number of miles traveled and the speed during each trip. The instrument registers upon a tape which is divided by lines into minutes. A curve is plotted by the machine and the owner is able to tell by examining the tape just what the truck did throughout the day. The device is locked securely so that tampering is impossible almost.

**Brown Traflog**—An instrument which is dependent upon vibration only for telling when a truck has stopped, how long it stopped, etc., is offered by the Brown Traflog Co., Cleveland, O. The feature of this machine is that it is not visible and may be placed under the seat or in any part of the car where the driver is not likely to find it. It is locked securely and

by means of a pencil curve plotted on a chart, it tells the time of stops and the length of time the truck was inoperative. It tells also whether the motor was stopped and in this way gives the owner an idea of the efficiency of his drivers. The Brown instrument and chart showing the method of making speed records is illustrated in Fig. 2.

**Jones Recording Speedometer**—The Jones speedometer now handled by the H. W. Johns-Manville Co., is made in a number of forms, one type being especially applicable to commercial cars. This shown in Fig. 2, is known as the recording speedometer and tells the owner of a truck the time and length of stops and the trip and total mileage negotiated. This instrument has been on the market for some time and has been taken up by a big following in the commercial car field.

**Veeder Hubodometer**—The Veeder Mfg. Co., Hartford, Conn., offers an easily attachable hubometer which is claimed to be foolproof, waterproof and collisionproof, and much more may be read easily. The

Veeder is attached to the hub of a vehicle and registers the mileage traveled up to 9999.9. A new type has been brought out recently which is neat in appearance and is claimed to do its work positively. One type of Veeder is illustrated in Fig. 4.

**Sewell Wheel**—The Sewell cushion wheel manufactured by the Sewell Cushion Wheel Co., Detroit, consists of an accordion-shaped rubber cushion lying between the felloe of the wheel and the floating rim, as shown in Fig. 3. The flange on the side of the wheel keeps both floating rim and rubber cushion in place. For exceedingly heavy trucks, the accordion cushion is discarded and the solid type substituted. For light cars the cushioning is gotten by a series of rubber tubes lying across the wheel. In all three types the principal is the same. The shock is first transmitted to the tire of the truck and finally to the rubber cushion.

**Keller Wheel**—This wheel, manufactured by Keller Bros., Hibbing, Minn., has spokes which act as pistons and in their movement allow the hub to rise or fall a distance of  $2\frac{1}{2}$  inches. The twelve spokes are really that number of air compressors and as the wheel passes over an obstruction the shock is said to be absorbed by the compression of the pistons. In tests performed the maker claims the wheel showed unusual non-skid features and extremely good wearing qualities owing to the tire being made of hard rubber. The Keller wheel is shown in Fig. 3.

**Motors for Trucks**—A great number of motor makers have made a specialty of motors for commercial cars and this year sees the majority of the products equipped with governors of some sort or if not provision is made for the installation of one. The Continental company, the Buda and the Rutenbar company all offer special types of motors for trucks, with detail improvements over last year's model. Sturdiness of construction is the main feature while fool-proofing the motor has received much attention.

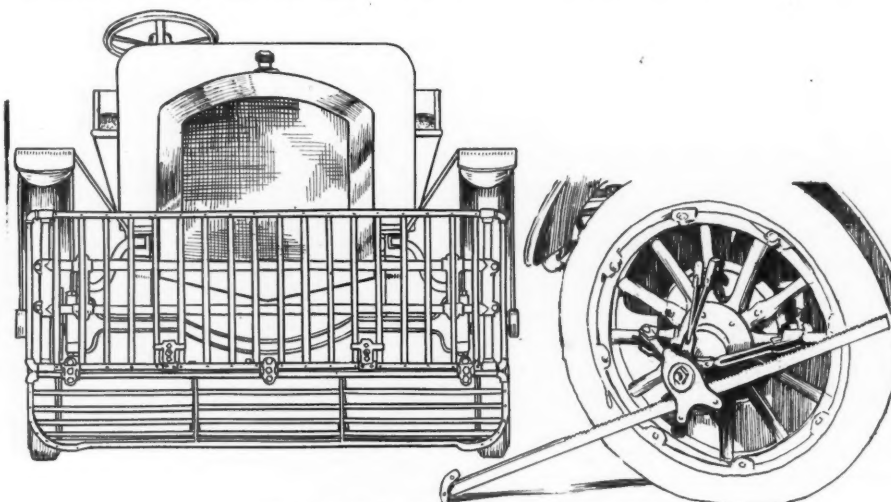


FIG. 5—TWO NEW TRUCK ACCESSORIES

To the left is shown the Commercial fender installed on a car and to the right is the Never-Mire jack, which pulls a truck out of a mud hole without any effort on the part of the driver





# Manufacturers' Communications



## St. Louis Dealer Answers R. H. Combs on Electric vs Gas Lighting Cost

**S**T. LOUIS, Mo.—Editor Motor Age—This is in reply to the article in Motor Age of January 8 by R. H. Combs, of the Prest-O-Lite Co., in his comparison of costs of starting systems, in answer to my article in Motor Age of recent issue in which the writer asked Mr. Combs to give actual cost figures on electric and gas lighting.

Mr. Combs starts his article by saying the user of gas pays only for the gas he uses, but the user of electricity pays for his light whether he uses it or not. This is very misleading and is not the case at all. There are so many different cases that to call attention to any one of them will prove this—the electric generator is running and charging the storage battery when the car is in operation—but this does not mean to the owner that he is paying for lighting his car when he is operating in the day time. He is simply storing his light during the day for use at night.

My article of December 25 in Motor Age claimed the electric generator on the medium-priced car is smaller in proportion than on the high-priced, high-powered car, and that the losses are approximately in proportion and the battery on the medium-priced car is in proportion to the generator and starter; therefore, it stands to reason that the losses are not as great as on the high powered cars. My article took Mr. Combs' maximum figures of 12 per cent and not any figures furnished by the Packard company. Mr. Combs states that the addition of weight was overlooked. The difference in weight of our medium-priced car between 1913 and 1914 is 19 pounds. The 1913 car did not have an electric starter and this year the electric starter is used. The electric starter and battery used weighs 90 pounds. A Prest-O-Lite tank and fittings weigh 37 or 38 pounds, which leaves a difference of 53 or 54 pounds. The car referred to is exactly the same size, but the reduction in weight is made in using the higher grades of material.

Mr. Combs claims that Mr. Joy, of the Packard company, or myself did not make an allowance for bulb replacements, battery renewals, electrical repairs, additional fuel and tire expense, due to increased weight, etc. Mr. Combs grants the buyer of the Packard or other high-priced cars would not care about this loss. If the buyer of this type car does not care about this expense, the losses in the smaller car being in proportion to the larger car, why should a purchaser of a \$1,200 car worry

about \$1.34 for starting and lighting for every 1,200 miles of travel?

Mr. Combs states it takes 10 to 12 per cent more fuel to operate the electric dynamo. His next item is 10 to 15 per cent more tire expense. I would like to know how he or any one else can arrive at this expense on account of additional weight which is figured above on our car of being 19 pounds heavier this year than last. This extra weight means absolutely nothing, as we can positively show on our medium-priced cars using 34 by 4 and 32 by 3½ tires a mileage of 5,000 to 6,500 miles. This is not taken on one car, but is an average of the whole. Mr. Combs states it takes 10 to 12 per cent more fuel to operate the electric dynamo and then he

adds 5 to 10 per cent more fuel on account of increased weight. Anyone reading Mr. Combs article will see readily there is no reason in this statement as it would then mean a total loss of 15 to 22 per cent for dynamo loss and increased weight.

Assuming the increased weight on account of the electric starter is more than 19 pounds, the extra weight of the starter and battery, less than weight of the other form of lighting must be considered, and as a gas tank and fittings weighs 38 pounds, and as this extra weight is not directly on the tires, but on the springs, I cannot see where Mr. Combs can tell the public that it takes 10 to 15 per cent more tire expense to operate an electric lighted car than it does a gas lighted car, in fact, this looks like guess work on Mr. Combs' part.

Mr. Combs also states it will take \$12.50 per year for battery maintenance and \$5 to \$15 per year for electrical repairs, based on 2 years' use. Where he gets these figures and how he arrives at this charge is known only to Mr. Combs, as I have been unable to verify them through quite an extended investigation. More guess work.

The acetylene lighting cost, according to Mr. Combs, is 5 cents per hour. All repair expense, bulbs, etc., is charged against the electric starting and lighting system, but the leaky gas tank, leaky hose connections, half-filled tanks, broken reflectors, head lamp glass, replaced gas tips, the time and inconvenience of getting a new tank, lighting the lamps on a rainy night or muddy road, finding your tank empty 40 miles from home is not taken into consideration.

To sum up the cost of the gas lighting system against the electric starting and lighting system on the medium-priced car, the figures of \$1.34 per 1,200 miles of travel will stand. Bulb replacement will not be any more than replacing broken gas tips, reflectors, etc. In fact, electric light bulbs and gas tips cost exactly the same—35 cents each, but the gas reflectors run from \$1.25 to \$2.50 each. The additional expense of the electric system, if any, is certainly offset by the convenience of the starting feature, which allows the women to drive cars now, whereas with a gas system they were unable to crank the motor, and the only time they could enjoy the family car would be when the father or son was at home, and had the time to do the driving.—F. S. Wiemeyer, St. Louis branch, Buick Motor Co.

## Coming Motor Events

### SHOWS, CONVENTIONS, ETC.

January 17-24—Show, Detroit, Mich.  
January 17-24—Show, Pittsburgh, Pa.  
January 19-24—Show, Washington, D. C.  
January 20-24—Show, Baltimore, Md.  
January 24-February 7—Show, Montreal Can.  
January 24-31—Rochester, N. Y., show.  
January 24-31—Chicago show.  
January 26-31—Scranton, Pa., show.  
January 31-February 7—Minneapolis show.  
February 2-7—Show, Troy, N. Y.  
February 2-7—Show, Buffalo, N. Y.  
February 3-7—Show, Kalamazoo, Mich.  
February 4-7—Show, St. Joseph, Mo.  
February 8-14—Show, Portland, Me.  
February 9-14—Buffalo truck show.  
February 9-14—Show, Grand Rapids, Mich.  
February 9-14—Show, Seattle, Wash.  
February 11-14—Show, Louisville, Ky.  
February 11-14—Show, Geneva, N. Y.  
February 16-22—Kansas City show.  
February 16-21—Show, Toronto, Can.  
February 18-21—Bloomington, Ill., show.  
February 21-28—Newark, N. J., show.  
February 22-March 5—Cincinnati, O., show.  
February 23-28—Omaha show.  
February 23-28—Indianapolis show.  
March 2-4—Cincinnati commercial car show.  
March 3-7—Show, Ft. Dodge, Ia.  
March 4-7—Show, Tiffin, O.  
March 7-14—Boston passenger car show.  
March 9-14—Show at Des Moines, Ia.  
March 17-21—Boston truck show.  
April 12-19—Austrian show.

### CONTESTS

February 21—Vanderbilt cup race, Santa Monica, Cal.  
February 23—American grand prix, Santa Monica, Cal.  
May 24-25—Targa Florio race.  
May 30—Indianapolis 500-mile race.  
June 9-11—Isle of Man road races, Great Britain.  
July 3-4—Road races, Tacoma, Wash.  
July 4—French grand prix, Lyons.  
July 25-26—Belgium grand prix road races.  
August 28-29—Road races, Elgin, Ill.  
September 9—Road race, Corona beach, Cal.  
September 9—Italian grand prix.  
November—El Paso-Phoenix road race.





# Capacity Classification and Motor Truck Buyers' Guide

## Prices, Body Styles and Dimensions Given

MOTOR AGE presents herewith a tabulation of the commercial cars on the 1914 market segregated according to capacity, the scope of each class as shown being, under 1 ton, 1 to 2 tons, 2 to 3 tons, 3 to 4 tons, 4 to 5 tons, 5 tons, over 5 tons and the public service class. The 1 to 2 tons class includes all trucks of 2,000 pounds to 3,999 pounds, the 2 to 3 tons class, all vehicles of 4,000 to 5,999, etc. The public service division has aimed to include all cars listed which are used for general public utilities. Fire apparatus, undertakers' wagons, patrols, etc., are included in this division.

The second column gives the chassis price of the vehicles which in the majority of cases includes the conventional stake body. Where the price is not given, the data was not obtainable from the manufacturer due in most instances to unsettled conditions at the factory occasioned by improvements in the car.

Under body style the word optional is mentioned frequently, this being true of the majority of the trucks listed. Practically all the makers of commercial vehicles are prepared to mount any body style upon the chassis, and the demands of the different trades being variable the maker offers any body style. The price of the car with the body is usually left blank when the word optional is used under body style, for the reason that the price is determined by the style of body selected.

In the last three columns the dimensions of the different body styles are given. The abbreviation Opt. is used for optional. With the body styles given as optional the dimensions will also be optional. However, in a few instances, dimensions are given and these usually are the maximum figures allowed.

Those in the market for a commercial car had best consult the buyers' guide first for all trucks of the capacity desired and within their purse limits. The mechanical characteristics of these cars are then compared by a study of the specification tables on pages 54 to 63.

For example, a buyer may have \$1,800 to spend on a truck and the vehicle must have a capacity of not less than 3,000 pounds and be fitted with a stake body. For such a truck the 1 to 2-ton class is scrutinized. Here the buyer will find the Admiral with a stake body listed at \$1,475, the Moon at \$1,800, the Menominee at \$1,800, the Gay at \$1,675 and the Krebs at \$1,775. The specifications of these five trucks are then compared, and by elimination the proper vehicle may be chosen.

In a number of cases, special body types are offered as stock as, for example, in the 1 to 2-ton class the Progress lists a brewery truck, the Koehler a plumbers' vehicle and a furniture truck.

There is no method of ascertaining which trucks listed in the buyers' guide are of unique construction and hence it is best always to revert to the specifications after making a selection in the guide.

Although the public service division lists a number of makers of vehicles it should not be taken that these are the only manufacturers in the field for the majority of those listed in the specification tables are in a position to equip with public service bodies. However, those which are mentioned in the public service class have specialized in the matter of bodies of this sort. In this class no dimensions are given for nearly every requirement calls for different figures.

TRUCKS UNDER 1-TON CAPACITY

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Atterbury, A.	1,500	.....	Optional	.....	3' 6"	Opt.	Opt.
Bauer, A.	1,000	\$1,000	Open Ex.	\$1,150	3' 7"	1' 6"	6'
Bauer, B.	1,500	1,000	Open Ex.	1,250	3' 7"	1' 6"	7'
Bauer, C.	1,000	1,000	Inclosed	1,250	3' 7"	1' 6"	6'
Bauer, D.	1,500	1,000	Inclosed	1,350	3' 7"	1' 6"	6'
Bessemer, C.	1,000	1,250	Optional	.....	Opt.	Opt.	Opt.
Best, A.	1,000	750	Open Ex.	800	3' 6"	2' 7"	6'
Brown, 1/2 ton.	1,500	1,650	Optional	.....	3' 8"	4' 8"	7' 6"
Buckeye, VI.	800	900	Covered	950	3' 4"	4' 4"	5' 6"
Buckeye, VII.	1,500	1,125	Optional	1,200	3' 8"	.....	6'
Buick, 3.	1,000	1,000	Open Ex.	1,100	3' 7"	Opt.	5' 2 1/2"
Buick, 3.	1,000	1,000	Stake	1,150	3' 7"	Opt.	5' 2 1/2"
Buick, 3.	1,000	1,000	Screen	1,200	3' 7"	Opt.	5' 2 1/2"
Buick, 3.	1,000	1,000	Panel	1,250	3' 7"	Opt.	5' 2 1/2"
Buick, 4.	1,500	1,125	Open Ex.	1,250	3' 7"	Opt.	8' 2"
Buick, 4.	1,500	1,125	Stake	1,300	3' 7"	Opt.	8' 2"
Buick, 4.	1,500	1,125	Screen	1,350	3' 7"	Opt.	8' 2"
Butler, 1914.	1,500	1,650	Express	1,775	4'	.....	8' 8"
Chase, 1000-lb.	1,000	855	Optional	900	3' 8 1/2"	10'	10'
Commerce, 1,000-lb.	1,000	875	Panel	.....	3' 5"	4' 4"	5' 4"
Dart, 750-lb.	750	.....	.....	800	.....	.....	.....
Dart, B.	1,500	1,300	Express	1,300	3' 10"	1'	.....
Dispatch, 1914.	1,200	825	Open	850	3' 4"	.....	6'
Dispatch, 1914.	1,200	825	Panel	900	3' 4"	.....	6'
Dorris, 1/2-ton.	1,500	2,100	Optional	.....	Opt.	Opt.	Opt.
Fargo, E.	1,500	800	Express	900	3' 9"	.....	6' 6"
Flint, C.	1,000	750	Panel	875	3' 6"	2' 7"	6'
Flint, C.	1,600	1,370	Open Ex.	1,450	3' 9"	2' 9"	7' 3"
Flint, C.	1,600	1,370	Panel	1,550	3' 9"	2' 9"	7' 3"
Gabriel, K.	.....	1,000	Optional	.....	Opt.	Opt.	Opt.
Geneva, 2.	1,100	1,250	Panel	1,350	3' 9"	4' 7"	4' 10"
Geneva, 2.	1,200	1,250	Open Ex.	1,300	3' 9"	.....	5' 3"
Hupmobile, 32.	800	.....	Inclosed	1,075	3' 4"	4' 8"	4' 4"
International, MW.	1,000	.....	Optional	.....	3' 6"	11'	6' 4"

TRUCKS UNDER 1-TON CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
International, MA.	1,000	.....	Optional	.....	3' 6"	11'	6' 4"
Jeffery, 1514.	1,500	.....	Optional	.....	Opt.	Opt.	Opt.
Kearns, A.	1,500	\$850	Open Ex.	\$1,175	3' 6"	1' 8"	6'
Kearns, A.	1,500	850	Panel	1,200	3' 4"	5'	5'
Kisselkar.	1,500	1,500	Express	1,625	3' 8"	.....	7'
Kosmath, 1914.	1,000	850	Optional	900	3' 8"	Opt.	5' 7"
Krebs, E.	1,000	950	Optional	.....	3' 6"	4' 8"	5' 7"
Krebs, DB.	1,500	1,425	Screen	1,600	3' 10"	4' 10"	6' 10"
Krebs, DB.	1,500	1,425	Panel	.....	3' 10"	5'	6' 8"
Landshaft, C.	1,500	1,000	Express	1,075	3' 7"	.....	7' 3"
Light, 800-lb.	800	.....	.....	.....	3' 8"	2' 2"	1500
Lippard-Stewart, Cl.	500	1,650	Optional	.....	Opt.	Opt.	Opt.
Maccarr, A.	1,500	1,650	Express	1,825	3' 7"	5'	7'
Marmon, Del.	1,500	2,500	Optional	.....	2' 10"	.....	4' 4"
Menominee, A-3.	1,500	1,125	Express	1,200	3' 6"	.....	6' 6"
Menominee, A 3.	1,500	1,125	Stake	1,200	5'	.....	7'
Mercury, P.	1,000	.....	Open Ex.	750	3' 2"	10"	6'
Mercury, P.	1,000	.....	Canvas Pan.	850	3' 2"	4' 6"	6'
Mercury, P.	1,000	.....	Wood Pan.	870	3' 2"	4' 6"	6'
Mercury, P.	1,000	.....	Fore Door	900	3' 2"	4' 6"	6'
Miller, A.	1,000	800	Optional	.....	3' 8"	4' 6"	5' 7"
Modern, F.	1,500	1,500	Optional	.....	Opt.	Opt.	Opt.
Monitor, G.	1,000	1,050	Express	1,050	3' 6"	.....	6' 8"
Moon, A.	1,000	1,350	Optional	1,450	4'	.....	6'
Moreland, 1/2-ton.	1,500	1,700	Optional	.....	Opt.	Opt.	Opt.
O. K., A.	1,200	800	Optional	850	4' 8"	5' 10"	11' 8"
Overland, 79.	800	.....	Express	900	3' 6"	.....	5' 1"
Overland, 79.	800	.....	Panel	950	2' 8"	4' 4"	5' 4"
Palmer-Moore, C.	1,600	1,350	Optional	.....	3' 8 1/2"	.....	6' 8"
Perfex, 18.	1,000	875	Optional	.....	3' 6"	.....	5' 6"



## Capacity, Classification and Motor Truck Buyers' Guide—Continued

## TRUCKS UNDER 1-TON CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Rockford, 1-ton	1,500	\$1,500	Optional		Opt.	Opt.	Opt.
Service, J.	1,500	1,350	Optional		Opt.	Opt.	Opt.
Sievert, H.	1,500	1,250	Optional	\$1,350	3' 8"	1' 5"	7'
Signal, 1-ton	1,500	1,350	Optional	1,450	3' 10"		8'
Signal, 1-ton	1,500	1,350	Open Pan.	1,525	3' 10"	4' 6"	8'
Signal, 1-ton	1,500	1,350	Inclosed Pan.	1,550	3' 10"	4' 6"	8'
Signal, 1-ton	1,500	1,350	Express	1,500	3' 10"	4' 6"	8'
Stegeman, 1-ton	1,500	1,000	Optional		Opt.	Opt.	8'
Stewart, 1-ton	1,500	1,500	Panel	1,650	3' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Top Ex.	1,625	3' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Open Ex.	1,625	3' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Screen	1,650	4' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Stake	1,625	4' 8"	5'	7'
Studebaker, Del.	1,500	1,050	Panel	1,150	3' 5 1/2"		5' 11"
Studebaker	1,500	1,050	Express	1,150	3' 7"		6' 1"
Tiffin, A.	1,200	1,000	Stake		5'	4'	9' 6"
Tiffin, A.	1,200	1,000	Express		4'	4'	9'
Tiffin, A.	1,200	1,000	Furniture		5'	4' 8"	9' 6"
Trabold, 1-ton	1,500	975	Express	1,075			8'
Wade, Del.	800	400	Optional	425	3'		8'
Wagenhals	800		Optional	690	3' 6"	2' 6"	5' 10"
White, GBBE	1,500	2,100	Optional	2,250	3' 7"	5'	6' 10"
Willys-Utility, 68	1,500	1,350	Express	1,400	3' 10"	5'	8'
Willys-Utility, 65	1,500	1,350	Stake		3' 10"	3'	8'
Willys-Utility, 65	1,500	1,350	Screen		3' 10"	5'	8'
Willys-Utility, 65	1,500	1,350	Inclosed		3' 10"	5'	8'
Willys-Utility, 65	1,500	1,350	Flat Top		3' 10"	5'	8'
Willet, M.	1,500	1,650	Optional		3' 4"		7' 4"
Zimmerman							

## TRUCKS OF 1 TO 2 TONS CAPACITY

Adams, A.	2,000	\$1,850	Flare Board	\$2,215	3' 10"	1' 2"	9'
Adams, A.	2,000	1,850	Flare Board	2,283	4' 6"	1' 4"	11'
Adams, A.	2,000	1,850	Stake	2,218	3' 10"	3' 4"	9'
Adams, A.	2,000	1,850	Stake	2,238	4' 6"	3' 4"	11'
Adams, D.	3,000	2,300	Flare Board	2,443	3' 10"	1' 2"	11'
Admiral C.	3,000	1,475	Express	1,525	4'	2' 10"	9'
Admiral, C.	3,000	1,475	Stake	1,525	Opt.	2' 10"	9'
Armleder, B.	2,000	2,200	Express	2,400	4' 2"	5' 10"	9'
Armleder, B.	2,000	2,200	Panel	2,550	4'	5' 10"	8'
Armleder, B.	2,000	2,200	Express	2,375	4' 2"	5' 10"	9'
Atterbury, B.	2,000		Optional		4'		8'
Auglaize, H.	2,000	950	Express	950	3' 4"	10'	8'
Auglaize, G.	2,000	1,350	Express	1,400	3' 6"	10'	8' 10"
Autocar, F.	3,000		Optional		4' 3"	2' 7"	9'
Available, 25.	2,000	1,350	Express	1,450	3' 8"	1' 2"	8' 6"
Available, 25.	2,000	1,350	Furniture	1,500	3'	2'	9' 6"
Available, 25.	2,000	1,350	Grocers	1,500	3' 8"	5'	8' 6"
Available, 25.	2,000	1,350	Panel Top	1,600	3' 8"	5'	8' 6"
Avery, 1-ton	2,000	1,600	Flare Board		4'		9'
Barker, U.	2,000	2,000	Optional	2,075	3' 8"		11'
Blair, 1 1/2-ton	3,000	2,850	Optional		5' 2"	Opt.	Opt.
Buckeye, V-4	3,000	1,900	Optional	2,000	3' 10"		7' 10"
Chase, K.	2,000	1,350	Optional		3' 8 1/2"	1' 2"	6' 10"
Chase, H.	2,000	1,200	Optional	1,250	3' 8 1/2"	1' 2"	6' 10"
Chase, L.	3,000	1,675	Optional	1,750	4' 2 1/2"	1' 4"	7' 10"
Coleman, B.	2,000	1,950	Stake		4' 6"		8' 6"
Coleman, B.	2,000	1,950	Express		3' 10"		8' 6"
Continental	3,000	1,850					
Corbitt, F.	2,500	2,000	Stake	2,085	4'	3' 6"	11'
Corbitt, F.	2,500	2,000	Flat	2,065	4' 10"	3' 6"	11'
Corbitt, F.	2,500	2,000	Flare Board	2,075	4'	3' 6"	11'
Crown, B.	2,000	2,300	Optional		Opt.	Opt.	9'
Danielson, A.	3,000	2,000	Optional		Opt.	Opt.	11'
Dart, C.	3,000	1,775	Express		3' 10"	1' 2 1/2"	
Diamond T, J.	3,000	2,250	Optional		Opt.	Opt.	Opt.
Federal		1,800					
Four Wheel Drive, G.	3,000	3,600	Optional		Opt.	Opt.	Opt.
Gabriel, H.		1,500	Optional		Opt.	Opt.	Opt.

## TRUCKS OF 1 TO 2 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Gay, F.	2,000	\$1,475	Optional	\$1,575	3' 10"		8'
Gay, G.	3,000	1,675	Optional	1,775	4'		9'
G. M. C., VC	2,500	1,900	Flare Board	2,062	4' 6"	1' 10"	10'
G. M. C., VC	2,500	1,900	Screen	2,145	4' 6"	5'	10'
G. M. C., VC	2,500	1,900	Stake	2,040	4' 6"	3' 4"	10'
G. M. C., VC	2,500	1,900	Furniture	2,110	4' 2"	5'	12'
G. A. Gramms, 1-ton	2,000	1,750	Optional		Opt.	Opt.	Opt.
Harvey, D.	3,000	1,875	Furniture	2,000	3' 10"	1' 6"	10'
Harvey, D.	3,000	1,875	Stake	2,000	5'	3'	10'
Horner, 1-ton	2,000	2,000	Optional		Opt.	Opt.	Opt.
Horner	3,000	2,250	Optional		Opt.	Opt.	Opt.
Ideal, I.	2,000	1,500	Optional		3' 8"	3' 3"	8' 6"
Ideal, H-2	3,000	2,000	Optional		4' 6"	3' 4"	10'
Jeffery, 2014	2,000						
Kalamazoo, B.	3,000	1,590	Stake		5'		9'
Kalamazoo, B.	3,000	1,590	Express		4' 1"		8' 9"
Kelly, K-30	2,000	2,000	Optional		Opt.	Opt.	Opt.
Kisselkar, 1-ton	2,000	1,850	Stake	1,975	3' 4"		9'
Kisselkar, 1 1/2-ton	3,000	2,100	Stake	2,250	5' 5"		8'
Koehler, 1-ton	2,000	725	Open Flare	750	4'	1' 5"	7'
Koehler, 1-ton	2,000	725	Express	790	4'	4' 7"	7'
Koehler, 1-ton	2,000	725	Canvas Side	800	3' 8"	4' 5"	7'
Koehler, 1-ton	2,000	725	Panel	900	3' 8"	4' 5"	7'
Koehler, 1-ton	2,000	725	Stake	750	3' 8"		7'
Koehler, 1-ton	2,000	725	Plumber	800	3' 8"	1'	8'
Koehler, 1-ton	2,000	725	Baker	925	4'	4' 8"	8'
Koehler, 1-ton	2,000	725	Furniture	825	4' 2"	1' 5"	9'
Krebs, AA	2,000	1,425	Flare Board	1,560	3' 9"		6' 10"
Krebs, D.	3,000	1,775	Optional		3' 10"		8' 8"
Krebs, DD	3,000	1,775	Flare Board		4' 2"		9' 8"
Krebs, DD	3,000	1,775	Stake		5' 6"		11'
Landshaft, J.	3,000	1,800	Express	1,900	4' 4"		10'
Lange, C.	2,000	2,250	Optional		Opt.	Opt.	Opt.
Lauth-Juergens, K.	2,000	2,100					
Lippard-Stewart, F.	3,000	2,300					
Little Giant, F.	2,000	1,200	Flare Board	1,275	3' 8"	1' 1"	9' 6"
Little Giant, F.	2,000	1,200	Canvas Top	1,325	3' 8"	4' 9"	9' 6"
Little Giant, F.	2,000	1,200	Stake	1,300	3' 8"	2' 6"	9' 6"
Little Giant, F.	2,000	1,200	Panel	1,375			
Little Giant, H.	2,000	1,350	Flare Board	1,425	3' 8"	1' 1"	9' 6"
Little Giant, H.	2,000	1,350	Canvas Top	1,475	3' 8"	4' 9"	9' 6"
Little Giant, H.	2,000	1,350	Stake	1,450	3' 8"	2' 6"	9' 6"
Little Giant, H.	2,000	1,350	Panel	1,525			
Lord Baltimore, B.	2,000	1,800	Screen	2,000	3' 10"	6'	9'
Maccarr, B.	2,000	1,900	Express	2,100	3' 10"	5' 6"	8' 6"
Maccarr, C.	3,000	2,150	Express	2,250	3' 10"	5' 6"	9' 6"
Mack, 1-Ton	2,000	2,000	Optional		Opt.	Opt.	Opt.
Mais, C.	3,000	2,750	Optional		5'		8' 3"
Mais, D.	3,000	2,800	Optional		5'		10' 6"
Martin, S.	3,000						
Menominee, B-3	2,000	1,400	Express	1,500	3' 10"		8' 6"
Menominee, B-3	2,000	1,400	Stake	1,500	8'		8' 6"
Menominee, C.	3,000	1,800	Optional	1,950			10'
Modern, G.	2,000	1,700					
Modern, H.	3,000	1,950					
Monitor, D.	2,000	1,650	Optional	1,750	4'		8'
Moon, B.	3,000	1,800	Open Ex.	1,900	3' 10"		8' 6"
Moon, B.	3,000	1,800	Stake	1,950	3' 10"		8' 6"
Moon, B.	3,000	1,800	Inclosed	1,950	3' 10"		7' 8"
Moon, B.	3,000	1,800	Furniture	2,150	5'		9'
Moon, B.	3,000	1,800	Top Stake	2,050	5'		8' 5"
Moore, 1 1/2-ton	3,000	1,950	Optional		Opt.	Opt.	9' 6"
Mora, 24	2,000	1,400	Open Ex.	1,515	3' 9"		7' 6"
Natco, 15	2,000	1,925	Optional		Opt.	Opt.	Opt.
Nelson-LeMoon, D-1	2,000	1,800	Optional		Opt.	Opt.	Opt.
New York		2,000	Optional		Opt.	Opt.	Opt.
O. K., A.	2,000	800	Stake	1,520	5'		10'
Palmer-Meyer, 1-ton	2,000	1,600	Optional		4' 2"		6' 2"
Palmer-Meyer, 1 1/2-ton	3,000	1,975	Optional		4' 2"		
Pathfinder, 1-ton	2,000		Stake		5' 4"		5' 11"
Pathfinder, 1-ton	2,000		Inclosed		3' 8"	4' 3"	6' 8"
Progress, A.	3,000		Brewery	2,900	5'	3'	10'
Progress, A.	3,000		Express	2,850	5'	1'	10'
Progress, A.	3,000		Platform	2,800	5'	4'	10'



## Capacity, Classification and Motor Truck Buyers' Guide—Continued

## TRUCKS OF 1 TO 2 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Sandow, 1½ Ton.....	3,000	\$1,950	Optional.....	.....	Opt.	Opt.	Opt.
Sanford, K.....	2,000	1,660	Optional.....	\$1,750	Opt.	Opt.	Opt.
Sanford, L.....	3,000	1,910	Optional.....	2,000	Opt.	Opt.	Opt.
Selden, J.....	.....	2,000	.....	.....	.....	.....	.....
Service, J.....	3,000	1,800	Optional.....	.....	Opt.	Opt.	Opt.
Service, K.....	2,000	1,475	Optional.....	.....	Opt.	Opt.	Opt.
Service, M.....	3,000	1,675	Optional.....	.....	Opt.	Opt.	Opt.
Star, B.....	2,000	1,500	Optional.....	1,600	5'	2'10"	7'
Star, A.....	3,000	1,800	Optional.....	1,950	5'	3'	10' 8"
Stegeman, 1-ton.....	2,000	2,250	Optional.....	.....	Opt.	Opt.	Opt.
Stewart, 1-ton.....	2,000	.....	Optional.....	.....	Opt.	Opt.	Opt.
Sullivan, 51.....	2,000	1,050	Express.....	1,140	3'10"	2'10"	7' 6"
Sullivan, 51.....	2,000	1,050	Stake.....	1,140	4'	2'10"	7' 6"
Tiffin, G.....	2,000	2,000	Stake.....	.....	5' 6"	.....	10'
Tiffin, G.....	2,000	2,000	Express.....	.....	4' 8"	4'	9'
Tiffin, G.....	2,000	2,000	Furniture.....	.....	5' 6"	5'	10'
Tiffin, G.....	2,000	2,000	Coal.....	.....	4'	.....	9'
Tiffin, G.....	2,000	2,000	Brewers' Case.....	.....	5' 6"	.....	10'
Trabold, C.....	2,000	1,475	Express.....	1,575	3'11"	3' 2"	9'
Trabold, 1½-ton.....	3,000	.....	Express.....	1,900	Opt.	3' 2"	9' 6"
Universal, T.....	3,000	1,950	Stake.....	2,000	5' 2"	3' 4"	10'
Universal, C.....	3,000	1,950	Express.....	2,050	3' 8"	2'10"	10'
Veerac, B.....	2,000	1,100	Express.....	1,150	3' 6"	9' 6"	7' 4"
Veerac, B.....	2,000	1,100	Stake.....	1,175	4'11"	.....	7' 4"
Veerac, B.....	2,000	1,100	Inclosed.....	1,250	3' 6"	4' 4"	7' 4"
White, TBC.....	3,000	3,000	Platform.....	3,150	.....	5' 6"	9' 2"
White, TBC.....	3,000	3,000	Express.....	3,150	4' 4"	5' 6"	9' 2"
Wichita, A.....	2,000	1,650	Stake.....	1,775	5'	.....	8' 6"
Wilcox, L.....	2,000	.....	.....	.....	.....	.....	.....

## TRUCKS OF 2 TO 3 TONS CAPACITY

Adams, E.....	4,000	\$2,500	Flare Board.....	\$2,690	5'	1' 2"	11'
Adams, E.....	4,000	2,500	Platform.....	2,643	5'	2' 6"	11'
Armleder, H.....	4,000	2,150	Express.....	2,350	4' 2"	5'10"	11'
Armleder, H.....	4,000	2,150	Panel.....	2,450	4' 2"	5'10"	9'10"
Armleder, H.....	4,000	2,150	Stake.....	2,325	4' 2"	5'10"	9'11"
Armleder, H.....	4,000	2,150	Furniture.....	2,450	5' 6"	6' 6"	11'
Armleder, E.....	5,000	2,500	Express.....	2,750	4' 2"	5'10"	11'
Armleder, E.....	5,000	2,500	Ice.....	2,750	4' 2"	4'	9'
Armleder, E.....	5,000	2,500	Bottle Beer.....	2,800	4' 2"	6'	9'
Armleder, E.....	5,000	2,500	Furniture.....	2,850	5' 6"	6' 6"	11'
Armleder, E.....	5,000	2,500	Coal.....	2,800	4' 4"	2'	9'
Armleder, E.....	5,000	2,500	Brewery.....	2,800	4' 4"	3' 6"	10'
Atterbury, C.....	4,000	.....	Optional.....	.....	5'	Opt.	10'
Avery, B.....	4,000	2,700	Optional.....	.....	Opt.	Opt.	Opt.
Bessemer, B.....	4,000	1,800	Optional.....	.....	Opt.	Opt.	Opt.
Blair, D.....	5,000	3,250	Optional.....	.....	Opt.	Opt.	Opt.
Buckeye, V-5.....	4,000	2,200	Optional.....	2,300	3'10"	.....	7'10"
Chase, J.....	4,000	2,100	Optional.....	2,200	4' 6"	1' 4"	9'10"
Coleman, C.....	4,000	2,400	Stake.....	.....	5' 6"	.....	10' 6"
Coleman, C.....	4,000	2,400	Express.....	.....	4'	.....	10' 6"
Crown, C.....	4,000	3,000	Optional.....	.....	Opt.	Opt.	11'
De Kalb, D-2.....	4,000	2,600	Platform.....	.....	5'	Opt.	Opt.
De Kalb, D-2.....	4,000	2,600	Express.....	.....	5'	Opt.	Opt.
Dorris, 2-ton.....	4,000	2,500	Optional.....	.....	Opt.	Opt.	Opt.
Gabriel, L.....	.....	2,500	Optional.....	.....	Opt.	Opt.	Opt.
Garford, L.....	4,000	2,800	Optional.....	.....	Opt.	Opt.	Opt.
G. M. C., SC.....	4,000	2,600	Flare Board.....	2,770	5'	2' 1"	10'
G. M. C., SC.....	4,000	2,600	Screen.....	2,855	5'	5'	10'
G. M. C., SC.....	4,000	2,600	Stake.....	2,747	5'	3' 4"	10'
G. M. C., SC.....	4,000	2,600	Furniture.....	2,825	5' 6"	5'	11'
B. A. Gramm, 2-ton.....	4,000	2,750	Optional.....	.....	Opt.	Opt.	Opt.
Horner, 2-ton.....	4,000	2,650	Optional.....	.....	Opt.	Opt.	Opt.
Ideal, K.....	5,000	2,500	Optional.....	.....	5'	3' 5"	12'
Kelly, K-35.....	4,000	2,750	Optional.....	.....	Opt.	Opt.	Opt.
Kisselkar, 2½-ton.....	5,000	2,750	Stake.....	2,900	5'11"	.....	10'
Knox, R-3.....	4,000	3,000	Optional.....	.....	Opt.	Opt.	Opt.
Lange, B.....	4,000	3,000	Optional.....	.....	4' 6"	Opt.	10' 6"
Lauth-Juergens, L.....	4,000	2,800	Optional.....	.....	Opt.	Opt.	Opt.
Lewis, 21.....	5,000	3,500	Optional.....	.....	Opt.	Opt.	Opt.
Lord-Baltimore, D.....	4,000	2,300	Screen.....	2,500	5'	6'	10'

## TRUCKS OF 2 TO 3 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Mais, E.....	4,000	\$2,950	Optional.....	.....	5'	.....	10' 6"
Mais, F.....	4,000	3,000	Optional.....	.....	5'	.....	12' 3"
Mais, J.....	5,000	3,400	Optional.....	.....	.....	.....	.....
Martin, E.....	5,000	.....	Optional.....	.....	Opt.	Opt.	Opt.
Mogul, L.....	4,000	2,360	Express.....	.....	4'	.....	11'
Mogul, L.....	4,000	2,360	Stake.....	.....	4'	.....	11'
Mogul, L.....	4,000	2,360	Furniture.....	.....	5'	.....	14'
Mogul, G.....	4,000	2,750	Optional.....	.....	5'	.....	11'
Moore, 2-ton.....	4,000	2,500	Optional.....	.....	Opt.	Opt.	11' 6"
Moreland, 2-ton.....	4,000	2,350	Optional.....	.....	Opt.	Opt.	Opt.
Nelson-LeMoon, D-2.....	4,000	2,250	Optional.....	.....	Opt.	Opt.	Opt.
Packard, 2-ton.....	4,000	2,800	Optional.....	.....	Opt.	Opt.	Opt.
Pierce-Arrow, X-2.....	4,000	3,000	Optional.....	.....	Opt.	Opt.	Opt.
Reo, J.....	4,000	1,650	Optional.....	\$1,800	5' 6"	.....	9'10"
Rockford, 2-ton.....	4,000	2,500	Optional.....	.....	Opt.	Opt.	Opt.
Sandow, 2-ton.....	4,000	2,250	Optional.....	.....	Opt.	Opt.	Opt.
Schacht, 2-ton.....	4,000	2,650	Optional.....	.....	Opt.	Opt.	11'
Service, P.....	4,000	2,375	Optional.....	.....	Opt.	Opt.	Opt.
Speedwell, Y.....	4,000	2,850	Box.....	2,950	6'	1'	10' 6"
Speedwell, Y.....	4,000	2,850	Stake.....	2,950	6'	4'	10' 6"
Stegeman, 2-ton.....	4,000	2,950	Optional.....	.....	Opt.	Opt.	Opt.
Sternberg, 2-ton.....	4,000	2,800	Optional.....	.....	Opt.	Opt.	Opt.
Sternberg, 2½-ton.....	5,000	3,250	Optional.....	.....	2'10"	3'10"	10'4½"
Tiffin, M.....	4,000	2,600	Stake.....	.....	6'	.....	11' 2"
Tiffin, M.....	4,000	2,600	Express.....	.....	5'	4' 6"	10' 6"
Tiffin, M.....	4,000	2,600	Furniture.....	.....	6'	5'	12'
Tiffin, M.....	4,000	2,600	Coal.....	.....	4' 2"	.....	10'
Tiffin, M.....	4,000	2,600	Brewery.....	.....	6'	.....	11' 2"
Trabold, 2-ton.....	4,000	2,450	Express.....	2,550	5' 6"	3' 2"	12'
Transit, F.....	4,000	2,850	Optional.....	.....	Opt.	Opt.	14'
Twin City, 2-ton.....	4,000	1,350	Optional.....	.....	4'	.....	10'
U. S., E.....	4,000	2,800	Optional.....	.....	Opt.	Opt.	10'
Velie, Y.....	4,000	2,850	Optional.....	3,000	5'	Opt.	Opt.
Vulcan, 2-ton.....	4,000	2,750	Optional.....	.....	Opt.	Opt.	Opt.
Ware, A.....	.....	3,000	Optional.....	.....	Opt.	Opt.	Opt.
Wichita, B.....	4,000	2,100	Stake.....	2,250	5'10"	.....	9' 3"
Wilcox, N.....	4,000	.....	Optional.....	.....	Opt.	Opt.	Opt.

## TRUCKS OF 3 TO 4 TONS CAPACITY

Atterbury, B.....	6,000	.....	Optional.....	.....	6'	.....	12'
Avery, B.....	6,000	\$3,200	Standard.....	.....	6' 4"	.....	12'6"
Avery, A.....	6,000	3,200	Farm.....	.....	4' 4"	.....	10' 4"
Bessemer, A.....	6,000	2,100	Optional.....	.....	Opt.	Opt.	Opt.
Blair, E.....	7,000	3,750	Optional.....	.....	Opt.	Opt.	Opt.
Diamond T, G.....	6,000	3,350	Optional.....	.....	Opt.	Opt.	14'
Four Wheel Drive, B.....	6,000	4,000	Stake.....	\$4,150	5'	3'	11'
Four Wheel Drive, B.....	6,000	4,000	Optional.....	.....	Opt.	Opt.	Opt.
Garford, J.....	6,000	3,500	Optional.....	.....	Opt.	Opt.	Opt.
G. M. C., H.....	7,000	3,250	Flare Board.....	3,565	5' 6"	5' 6"	14'
G. M. C., H.....	7,000	3,250	Brewery.....	3,497	5' 6"	6'	14'
G. M. C., H.....	7,000	3,250	Furniture.....	3,520	6'	6'	14'
G. M. C., HU.....	7,000	3,500	Flare Board.....	3,795	5' 6"	5' 6"	12'
G. M. C., HU.....	7,000	3,500	Brewery.....	3,732	5' 6"	6'	12'
G. M. C., HU.....	7,000	3,500	Furniture.....	3,755	6'	6'	13'
B. A. Gramm, 3½-ton.....	7,000	3,600	Optional.....	.....	Opt.	Opt.	Opt.
Horner, 3-ton.....	6,000	3,200	Optional.....	.....	Opt.	Opt.	Opt.
Kelly, K-40.....	6,000	3,400	Optional.....	.....	Opt.	Opt.	Opt.
King, 3.....	7,000	3,350	Optional.....	.....	Opt.	Opt.	13'
Kisselkar, 3½-ton.....	7,000	3,350	Stake.....	3,500	6'	.....	13'
Knickerbocker, 3.....	6,000	3,750	Optional.....	.....	Opt.	Opt.	Opt.
Lauth-Juergens, M.....	6,000	3,450	Optional.....	.....	Opt.	Opt.	Opt.
Lewis, 21S.....	6,000	3,250	Optional.....	.....	Opt.	Opt.	Opt.
Mais, H.....	6,000	3,400	Optional.....	.....	5'	.....	14'
Martin, L.....	7,000	.....	Optional.....	.....	Opt.	Opt.	Opt.



## Capacity, Classification and Motor Truck Buyers' Guide—Concluded

## TRUCKS OF 3 TO 4 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Moore, 3-ton	6,000	\$3,150	Optional	.....	Opt.	Opt.	Opt.
Nelson-LeMoon, D-3	6,000	2,750	Optional	.....	Opt.	Opt.	Opt.
Nevada, H	6,000	3,500	Optional	.....	Opt.	Opt.	Opt.
Packard, 3-ton	6,000	3,400	Optional	.....	Opt.	Opt.	Opt.
Progress, 0	6,000	3,500	Brewery	\$3,700	6'	3' 6"	12'
Progress, 0	6,000	3,500	Trunk	3,600	6'	3' 6"	12'
Progress, 0	6,000	3,500	Package	3,700	6'	3' 6"	12'
Progress, 0	6,000	3,500	Bottle	3,800	5' 9"	14' 3"	12'
Peerless, 3-ton	6,000	3,700	Platform	.....	6'	Opt.	Opt.
Pope-Hartford, 3-ton	6,000	3,350	Platform	3,550	6' 6"	Opt.	14'
Royal, B-3½	7,000	3,400	Optional	.....	Opt.	Opt.	Opt.
Service, H	6,000	2,975	Optional	.....	Opt.	Opt.	Opt.
Standard, 3-ton	6,000	2,750	Exp. & Stake	3,050	Opt.	Opt.	12' 3"
Standard, 3-ton	6,000	2,750	Dump	3,350	Opt.	Opt.	10'
Standard, 3-ton	6,000	2,750	Van	3,500	Opt.	Opt.	18'
Stegeman, 3-ton	6,000	3,500	Optional	.....	Opt.	Opt.	12'
Sternberg, 1914	6,000	3,400	Optional	.....	Opt.	Opt.	Opt.
Transit, T	7,000	3,500	Optional	.....	Opt.	Opt.	14'
Universal, A	6,000	3,400	Stake	3,550	6'	3' 8"	Opt.
U. S., D	6,000	3,500	Optional	.....	Opt.	Opt.	12'
Velie, C	6,000	3,350	Standard	3,500	6'	Opt.	Opt.
Vulcan, 3-ton	6,000	3,250	Optional	.....	Opt.	Opt.	Opt.
White, GTA	6,000	3,700	Standard	3,850	6' 5"	.....	13'
Wichita, H	7,000	3,250	Stake	3,450	7'	3' 8"	13'
Wilcox, J.A.	6,000	.....	.....	.....	.....	.....	.....
Willet, L	6,000	2,800	Optional	.....	6'	Opt.	Opt.

## TRUCKS OF 4 TO 5 TONS CAPACITY

Garford, K	8,000	\$3,850	Optional	.....	Opt.	Opt.	Opt.
Knickerbocker, 4	8,000	4,000	Optional	.....	Opt.	Opt.	Opt.
Longest, 3-A	8,000	4,000	Optional	.....	Opt.	Opt.	Opt.
M & E, 4-ton	8,000	2,750	Stake	\$3,000	6'	.....	12'
Mogul, 0	8,000	3,800	Optional	.....	Opt.	Opt.	11' 6"
Moore, 4-ton	8,000	3,900	Optional	.....	Opt.	Opt.	Opt.
Packard, 4-ton	8,000	3,550	Optional	.....	Opt.	Opt.	Opt.
Peerless, 4-ton	8,000	4,000	Platform	.....	6'	Opt.	Opt.
Speedwell, Z	8,000	3,750	Box	3,850	6' 6"	1'	12' 6"
Speedwell, Z	8,000	3,750	Stake	3,850	6' 6"	4'	12' 6"
Standard, 3-ton	8,000	2,750	Keg	3,050	Opt.	Opt.	18'
Standard, 3-ton	8,000	2,750	Tank	3,300	Opt.	Opt.	18'
Stegeman, 4-ton	8,000	3,950	Optional	.....	Opt.	Opt.	Opt.
Sternberg, 4-ton	8,000	.....	Optional	.....	Opt.	Opt.	Opt.
Vulcan, 4-ton	8,000	4,000	Optional	.....	Opt.	Opt.	Opt.
Vulcan, 4½-ton	9,000	4,250	Optional	.....	Opt.	Opt.	Opt.

## TRUCKS OF 5 TONS CAPACITY

Atterbury, E	10,000	.....	Optional	.....	6'	.....	14'
A. I. C., C	10,000	\$3,500	Optional	.....	6'	.....	12' 6"
Avery, B-5	10,000	4,500	Stake	.....	6' 4"	3'	14'
Diamond T, G	10,000	3,600	Optional	.....	Opt.	Opt.	14'
Garford, D	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
G. M. C., KU	10,000	4,500	Flare Board	\$4,815	6'	6'	13'
G. M. C., KU	10,000	4,500	Brewery	4,745	6'	6'	13'
G. M. C., KU	10,000	4,500	Furniture	4,770	6'	6'	14'
G. M. C., KU	10,000	4,500	Dump	5,100	3' 10"	2' 3"	12'
G. M. C., KUL	10,000	4,600	Lumber	4,750	4' 5½"	4'	16'
G. M. C., K	10,000	4,250	Flare Board	4,575	6'	6'	14'
G. M. C., K	10,000	4,250	Brewery	4,502	6'	6'	14'
G. M. C., K	10,000	4,250	Furniture	4,520	6'	6'	14'
G. M. C., K	10,000	4,250	Dump	4,850	3' 10"	2' 3"	12'
B. A. Gramm, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Horner, 5-ton	10,000	4,200	Optional	.....	Opt.	Opt.	Opt.
Kelly, K-50	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Knickerbocker, 5	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.

## TRUCKS OF 5 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Lewis, 51	10,000	\$4,750	Optional	.....	Opt.	Opt.	Opt.
Locomobile, A	10,000	4,800	Optional	.....	Opt.	Opt.	Opt.
Mack, 5-ton	10,000	4,000	Optional	.....	Opt.	Opt.	Opt.
Moore, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Moreland, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Packard, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Peerless, 5-ton	10,000	4,500	Platform	.....	6'	.....	Opt.
Peerless, 5-ton	10,000	4,500	Hoist	.....	4'	2' 3"	12'
Pierce-Arrow, R-5	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Pope-Hartford, 5-ton	10,000	4,350	Stake	\$4,550	6' 6"	Opt.	14' Opt.
Pope-Hartford, 5-ton	10,000	4,350	Optional	.....	Opt.	Opt.	Opt.
Stearns, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	13'
Stearns, 5-ton	10,000	3,800	Platform	3,950	6'	5'	Opt.
Sternberg, 5-ton	10,000	3,900	Platform	4,050	6'	5'	Opt.
Transit, V	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Vulcan, 5-ton	10,000	4,500	Express	4,700	6'	Opt.	14'
White, TC	10,000	4,500	Standard	4,700	6' 5"	.....	13'

## TRUCKS OF OVER 5 TONS CAPACITY

Couple Gear, AC	12,000	\$5,600	Stake	\$5,800	6' 6"	.....	14'
Couple Gear, AC	12,000	5,600	Canvas Top	6,000	6' 6"	7'	14'
Couple Gear, AC	12,000	5,600	Panel	6,100	6' 6"	7'	14'
Couple Gear, AC	12,000	5,600	Dump	6,100	4' 6"	.....	11'
Couple Gear, ACT	.....	5,550	Tractor	.....	Opt.	Opt.	Opt.
Garford, F	12,000	4,850	Optional	.....	Opt.	Opt.	Opt.
Kisselkar, 6-ton	12,000	.....	Optional	.....	Opt.	Opt.	Opt.
Knox, Tractor	.....	4,350	Stake	4,500	6'	.....	14'
Knox, Tractor	.....	3,250	.....	.....	.....	.....	.....
Knox, M-3	40,000	3,750	.....	.....	.....	.....	.....
Knox, M-3	.....	4,100	Sing Tank	5,600	.....	.....	.....
Knox, M-3	.....	4,100	Doub Tank	5,900	.....	.....	.....
La France, 6-ton	12,000	5,500	Stake	.....	Opt.	Opt.	Opt.
Mogul, M	12,000	4,700	Optional	.....	Opt.	Opt.	Opt.
Mogul, U	12,000	4,750	Lumber	.....	6'	6'	15' 10"
Packard, 6-ton	12,000	4,650	Optional	.....	Opt.	Opt.	Opt.
Peerless, 6-ton	12,000	.....	Platform	.....	6'	.....	Opt.
Saurer, 6½-ton	13,000	5,800	Optional	.....	Opt.	Opt.	Opt.
Speedwell, X	12,000	4,400	Box	4,500	6' 9"	1'	15' 6"
Speedwell, X	12,000	4,400	Stake	4,500	6' 9"	4'	15' 6"
Sternberg, 6-ton	12,000	4,750	Optional	.....	Opt.	Opt.	Opt.
Sternberg, 7-ton	14,000	5,000	Optional	.....	Opt.	Opt.	Opt.
Vulcan, 7-ton	14,000	6,000	Optional	.....	Opt.	Opt.	Opt.

## PUBLIC SERVICE VEHICLES

Armleder, B	.....	\$2,200	Bus	\$2,750	12 Passengers
Armleder, B	.....	2,200	Patrol	3,200	.....
Armleder, H	.....	2,150	Bus	2,750	16 Passengers
Croxtan, T	.....	1,860	Taxicab	2,500	.....
Great Eagle, A	.....	.....	Ambulance	.....	.....
Great Eagle, A	.....	.....	Hearse	.....	.....
Great Eagle, D	.....	.....	Ambulance	3,500	to \$6,000
Great Eagle, D	.....	.....	Hearse	3,500	to \$6,000
Koehler, 1-ton	2,000	725	Bus	1,000	12 Passengers
Koehler, 1-ton	2,000	725	Hose Wagon	1,650	.....
Little Giant, F	.....	1,200	Bus	1,900	12 Passengers
Little Giant, H	.....	1,350	Bus	2,050	12 Passengers
Martin, B	3,000	.....	Fire Wagon	5,000	.....
Martin, A	4,000	.....	Fire Wagon	5,000	.....
Moon, B	.....	1,800	Bus	3,200	.....
S & S, A	1,500	2,000	Ambulance	3,250	.....
S & S, A	1,500	2,000	Hearse	3,500	.....
Stewart	1,500	1,500	Undertaker	2,100	.....
White, TBC	3,000	3,000	Bus	.....	.....
White, TBC	3,000	3,000	Fire Wagon	.....	.....
White, GBBE	1,500	2,100	Patrol	.....	.....
White, GBBE	1,500	2,100	Ambulance	.....	.....
White, GBBE	1,500	2,100	Hearse	.....	.....
Willys-Utility, 65	1,500	1,350	Bus	.....	.....



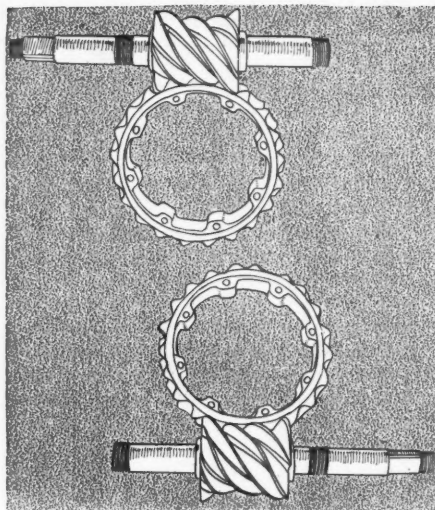


FIG. 1—TWO TYPES OF WORM DRIVE  
The top worm is shown above and the bottom type below

**LOAD Capacity**—The capacity given in the tables is the maximum load in pounds that the vehicle will hold with safety.

**Chassis Price**—The price of the car without the body. Usually a stake body is given at the price mentioned.

**Wheelbase**—Where the figure shown reads thus, 135-48, it means 135 and 48 inches.

**Tires**—When not otherwise noted, the tires are single tires. The asterisk after the size of the tire indicates that the tires are of the dual type.

**Bore and Stroke**—The bore and stroke measurements are given to the nearest 1/1000 inch.

**Horsepower**—The horsepower is that obtained by the use of the S. A. E. formula which reads  $\text{horsepower} = D^2 N \div 2.5$ , in which  $D^2$  is the square of the bore in inches

## Explanation of Terms Used in the

and N is the number of motor cylinders.

**Cylinder Shape**—L-head and T-head refer to cylinders whose shape resembles those shown in Fig. 3. The I-head cylinder has the valves in the head. The L-head sometimes has one set in the head and the other in the side.

**Cylinder Casting**—Pairs refers to cylinders that are cast two in a single casting. In the block casting all the cylinders are made in a single casting. The word separately is used to show that the cylinders have been cast separately.

**Camshaft Drive**—When the word gear is

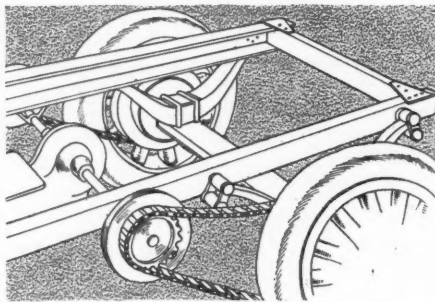


FIG. 2—CHAIN FINAL DRIVE  
The jackshaft is the member from which the chains are driven

mentioned the common spur gear is implied. Helical includes spiral and skew gears. Chain indicates a silent chain drive of the camshaft. All three types are shown in Fig. 4.

**Cooling**—When a pump is used to maintain circulation the water is forced through its path by means of a centrifugal or gear pump. The thermo-siphon system takes into consideration the fact that hot water will rise and does not require the use of a pump,

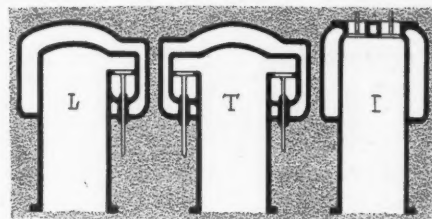


FIG. 3—THREE TYPES OF CYLINDERS  
The T-head has its valves on opposite sides and the L on one side

as the circulation is a natural one. In such cases the radiator is usually placed high above the motor.

**Radiator Suspension**—To protect the radiator from unnecessary shock it is suspended on springs or trunnions, or both, or ball joint to give it freedom of motion.

**Ignition System**—The single system consists of one source of current and one set of plugs. The dual system makes use of two sources of current and one set of plugs. In this case both magneto and battery are used. In the double system, two sets of spark plugs are required and two sources of current. However, in this case one set of plugs operate on the battery and the other set on the magneto. Duplex refers to a system which employs battery and magneto but the battery current passes through the magneto armature when cranking. Two-points employs two sets of plugs both firing at once.

**Ignition Control**—The hand control is familiar to all. The automatic control is one in which the spark automatically advances with an opening of the throttle and retards with the closing of the throttle or a correspondingly change in motor speed. In the fixed control, the spark is made to occur at a given point regardless of motor speed.



## Specifications of 1914 American Commercial Vehicles, Including

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Adams, A.....	2,000	\$1,850	121-36	Solid...	36x3 1/2	36x4	Under hood.	4	3.875x5.000	24.00	L-head...	Block...	Right...	Gear....	Pump....	Cushions...
Adams, D.....	3,000	2,300	136	Solid...	36x3 1/2	36x3 1/2	Under hood.	4	3.875x5.000	24.00	L-head...	Block...	Right...	Gear....	Pump....	Cushions...
Adams, E.....	4,000	2,500	140	Solid...	36x4	36x4*	Under hood.	4	3.875x5.000	24.00	L-head...	Block...	Right...	Gear....	Pump....	Cushions...
Admiral, C.....	3,000	1,475	125	Solid...	34x3 1/2	34x4	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Right...	Gear....	Thermo...	Springs...
A. I. C., C.....	10,000	3,500	136	Solid...	36x6	40x6*	Under hood.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear....	Pump....	Springs...
Armleder, B.....	2,000	2,200	136	Solid...	40x4	40x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Right...	Gear....	Pump....	Springs...
Armleder, H.....	4,000	2,150	136-60	Solid...	40x4	40x3*	Under hood.	4	4.500x5.000	32.40	L-head...	Block...	Right...	Gear....	Pump....	Springs...
Armleder, E.....	5,000	2,500	136-60	Solid...	40x4	40x3 1/2*	Under hood.	4	4.500x5.000	32.40	L-head...	Block...	Right...	Gear....	Pump....	Springs...
Atterbury, A.....	1,500	.....	118	Pneu...	34x4	34x4	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Right...	Gear....	Thermo...	S & T....
Atterbury, B.....	2,000	.....	128	Solid...	36x3 1/2	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear....	Pump....	S & T....
Atterbury, C.....	4,000	.....	143	Solid...	36x3 1/2	36x3 1/2*	Under hood.	4	4.250x5.500	28.90	L-head...	Block...	Left...	Gear....	Pump....	S & T....
Atterbury, D.....	6,000	.....	153	Solid...	36x4	36x4*	Under hood.	4	4.875x5.500	38.00	T-head...	Pairs...	Opp...	Gear....	Pump....	S & T....
Atterbury, E.....	10,000	.....	153	Solid...	36x5	42x6*	Under hood.	4	4.875x5.500	38.00	T-head...	Pairs...	Opp...	Gear....	Pump....	S & T....
Auglaise, H.....	2,000	950	96	Solid...	36x3	36x3	Under seat.	2	5.250x4.000	22.00	L-head...	Sep....	Right...	Gear....	Thermo...	.....
Auglaise, G.....	2,000	1,350	110	Solid...	36x3	36x3 1/2	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Right...	Gear....	Thermo...	.....
Autocar, F.....	3,000	.....	97	Opt...	34x4	34x5	Under seat.	2	4.750x4.500	18.00	L-head...	Sep....	Side...	Gear....	Pump....	Springs...
Available, 25.....	2,000	1,350	120	Solid...	36x3	36x3 1/2	Under floor.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Gear....	Thermo...	Springs...
Avery, C-1.....	2,000	1,690	128	Solid...	34x3 1/2	34x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear....	Pump....	Springs...
Avery, B-2.....	4,000	2,700	128	Solid...	36x4	36x3 1/2*	Under seat.	4	4.750x5.000	36.10	L-head...	Sep....	Left...	Gear....	Pump....	Springs...
Avery, B-3.....	6,000	3,200	128	Solid...	38x5	38x4*	Under seat.	4	4.750x5.000	36.10	L-head...	Sep....	Left...	Gear....	Pump....	Springs...
Avery, A-3.....	6,000	3,200	140	Wood...	.....	.....	Under seat.	4	4.750x5.000	36.10	L-head...	Sep....	Left...	Gear....	Pump....	Springs...
Avery, B-5.....	10,000	4,500	140	Solid...	38x6	38x5*	Under seat.	4	5.250x5.750	44.10	T-head...	Pairs...	Opp...	Gear....	Pump....	Springs...
Barker, U.....	2,000	2,000	130	Solid...	42x3 1/2	42x5	Under hood.	4	4.000x5.000	25.00	L-head...	Block...	Right...	Gear....	Opt....	Springs...
Bauer, A & C.....	1,000	1,000	96	Solid...	36x2	36x2	Under hood.	4	3.750x5.000	22.50	L-head...	Block...	Right...	Gear....	Thermo...	Rigid...
Bauer, B & D.....	1,500	1,000	96	Solid...	36x2	36x2 1/2	Under hood.	4	3.750x5.000	22.50	L-head...	Block...	Right...	Gear....	Thermo...	Rigid...

\* \* \* Drives on four wheels.

**ABBREVIATIONS:**—Tires: Pneu, pneumatic; \*, dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.



# Commercial Car Specification Tables

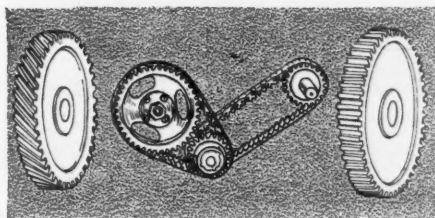


FIG. 4—METHODS OF CAMSHAFT DRIVE  
From left to right, the helical gear, silent chain and spur gear

When a motor has governed ignition the governor on the magneto makes the spark advance automatic. Only in the case of hand control is the driver permitted to advance or retard the spark; in the other instances this is done by motor mechanism.

**Lubrication**—In the splash system, the ends of the connecting rods dip into the oil reservoir in the crankcase and splash the oil to the cylinders and bearings of the motor by their centrifugal action. The pressure system is one in which oil is delivered directly to the bearings by leads. The splash-pressure system combines both the splash and the pressure, some of the oil being delivered directly to the bearings and some delivered by the splash.

**Clutch Type**—Expanding band and contracting band are the only two types requiring explanation. Both these types resemble the common emergency brake, the former consisting of two semi-circular bands that expand against the flywheel, while the latter are of the same appearance but contract against the flywheel.

**Gearset Type**—In the selective gearset, any speed may be obtained without first going through any other speed. In this type a shift may be made from first directly to

high. In the progressive type, on the other hand, in order to obtain third, it is necessary to pass through second. The planetary gearset consists of one big gear with internal teeth having within it and meshing with these teeth one or more small gears. In the planetary type the gears are always in mesh. The friction gearset consists of a driven disk pressing against a driving disk which is attached to a shaft which directly or indirectly revolves the rear wheels. In the individual clutch type of gearset, the gears do not slide but are always in mesh. The countershaft is driven by the master gears in the usual manner, and the direct drive is

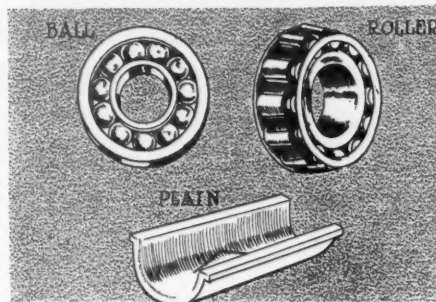


FIG. 5—THREE TYPES OF BEARINGS  
Showing one of each variety of ball, roller and plain

obtained by a dog clutch. The reduction drives are had by means of individual dog clutches secured to the driven shaft and which engage with corresponding clutch members on the sides of the driven gears, loosely mounted on the driven shaft.

**Final Drive**—In the bevel drive the power is transmitted from the propeller shaft through bevel gears to the rear axle. Worm

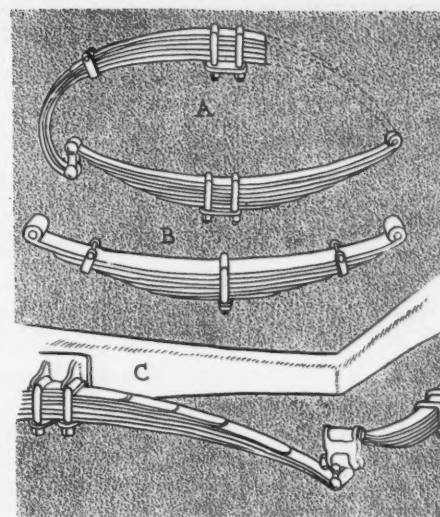


FIG. 6—COMMON SPRING TYPES  
A, three-quarter elliptic and elliptic. B, semi-elliptic and C, platform

drive means that a worm gear is used instead of a bevel. The internal gear drive means that the wheels are fitted with gears with internal teeth driven by gears on the ends of shafts parallel to the dead axes.

The chain drive, Fig. 2, consists of a chain from a jackshaft turning the rear wheels.

In the illustration the drive is known as a double-chain because two chains, one at either end of the jackshaft drive the rear wheels. There is another type known as the single-chain drive in which one chain is directly connected to a gear on the rear axle. The jackshaft is the member from which the side chains are driven.

**Springs**—Fig. 6 shows the three types of springs mentioned in the tables. The elliptic spring is shown when the view takes in the dotted line at A.

## Capacity, Horsepower, Motor Accessories, Gear Ratio, Etc.

IGNITION			Carburetor	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			Clutch Type	GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset		Rear Axle
			Type	Location		Forw'd Speeds	Front	Rear			Steering	Gear-Shift					
Sing.	Eisemann	Hand	Schebler	Spl-Pres.	Disk	Sel.	Amid	3	7.45-1	Chain	Ell.	Ell.	Left	Center	Ball	Opt.	Adams, A
Sing.	Eisemann	Hand	Schebler	Spl-Pres.	Disk	Sel.	Amid	3	7.45-1	Chain	Ell.	Ell.	Left	Center	Ball	Opt.	Adams, D
Sing.	Eisemann	Hand	Schebler	Spl-Pres.	Disk	Sel.	Amid	3	7.45-1	Chain	Ell.	Ell.	Left	Center	Ball	Opt.	Adams, E
Sing.	Bosch	Fixed	Schebler	Spl-Pres.	Cone	Sel.	Unit J	3		Chain	Ell.	Ell.	Left	Center	Roll	Roll	Admiral, C
Sing.	Simms	Hand	Holley	Splash	Cone	Sel.	Amid	4	8.00-1	Chain	Ell.	Ell.	Right	Right	Roll	Roll	A. I. C., C
Sing.	Bosch	Hand	Schebler	Splash	Disk	Sel.	Unit M.	3	5.00-1	Bevel	Ell.	Ell.	Left	Center	Ball	Ball	Armleder, B
Sing.	Bosch	Hand	Schebler	Splash	Disk	Sel.	Amid	3	8.00-1	Chain	Ell.	Ell.	Left	Center	Ball	Ball	Armleder, H
Sing.	Bosch	Hand	Schebler	Splash	Disk	Sel.	Amid	3	8.00-1	Chain	Ell.	Ell.	Left	Center	Ball	Plain	Armleder, E
Sing.	Bosch	Fixed	Stromberg	Spl-Pres.	Disk	Sel.	Unit M.	3	6.00-1	T Worm	Ell.	Ell.	Left	Center	Ball	Roll	Atterbury, A
Sing.	Bosch	Fixed	Stromberg	Spl-Pres.	Disk	Sel.	Unit M.	3	6.75-1	T Worm	Ell.	Ell.	Left	Center	Ball	Roll	Atterbury, B
Dual.	Bosch	Hand	Stromberg	Spl-Pres.	Disk	Sel.	Unit M.	3	Opt.	Opt.	Ell.	Ell.	Left	Center	Ball	Roll	Atterbury, C
Dual.	Bosch	Hand	Stromberg	Spl-Pres.	Disk	Sel.	Unit J	3	8.40-1	Chain	Ell.	Ell.	Right	Right	Roll	Roll	Atterbury, D
Dual.	Bosch	Hand	Stromberg	Spl-Pres.	Disk	Sel.	Unit J	3	8.40-1	Chain	Ell.	Ell.	Right	Right	Roll	Roll	Atterbury, E
Dual.	Remy	Gov.	Schebler	Spl-Pres.	Disk	Plan.	Unit J	2	4.00-1	Chain	Ell.	Ell.	Right	Right	Plain	Roll	Auglaise, H
Dual.	Remy	Hand	Schebler	Spl-Pres.	Disk	Sel.	Unit M.	3	4.00-1	Int G.	Ell.	Ell.	Left	Center	Plain	Roll	Auglaise, G
Sing.	Bosch	Fixed	Stromberg	Spl-Pres.	Disk	Prog.	Amid	3	7.10-1	Bevel	Ell.	Plat.	Right	Right	Roll	Roll	Autocar, F
Dual.	Briggs	Hand	Schebler	Splash	Cone	Sel.	Unit J	3	6.00-1	Chain	Ell.	Ell.	Left	Left	Ball	Ball	Available, 25
Dual.	Heinze	Hand	Rayfield	Spl-Pres.	Disk	Sel.	Unit M.	3	7.95-1	Chain	Ell.	Ell.	Left	Center	Roll	Roll	Avery, C-1
Dual.	Eisemann	Auto	Rayfield	Spl-Pres.	Disk	Sel.	Unit J	3	18.00-1	Chain	Ell.	Ell.	Right	Center	Roll	Roll	Avery, B-2
Dual.	Eisemann	Gov.	Schebler	Splash	Disk	Sel.	Amid	3	13.73-1	Chain	Ell.	Ell.	Right	Center	Roll	Roll	Avery, B-3
Dual.	Eisemann	Gov.	Schebler	Splash	Disk	Sel.	Amid	3	13.73-1	Chain	Ell.	Ell.	Right	Center	Roll	Plain	Avery, A-3
Dual.	Eisemann	Gov.	Schebler	Spl-Pres.	Disk	Sel.	Unit M.	3	9.90-1	Chain	Ell.	Ell.	Right	Center	Roll	Roll	Avery, B-5
Sing.	Eisemann	Fixed	Stromberg	Spl-Pres.	Disk	Sel.	Unit M.	4	8.60-1	T Worm	Ell.	Ell.	Left	Center	Ball	Ball	Barker, U
Doub.	Opt.	Hand	Schebler	Splash	Disk	Sel.	Unit M.	3	5.00-1	Bevel	Ell.	Ell.	Right	Center	Ball	Roll	Bauer, A & C
Doub.	Opt.	Hand	Schebler	Splash	Disk	Sel.	Unit M.	3	5.00-1	Bevel	Ell.	Ell.	Right	Center	Ball	Roll	Bauer, B & D

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: Ell, semi-elliptic; Ell, elliptic; Ell, 2 elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.





# Specifications of 1914 American Commercial Vehicles, Including

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Bessemer, C.	1,000	1,250	108	Solid...	34x2 1/2	34x3	Under hood.	4	3.500x4.500	19.60	L-head...	Block...	Left...	Gear...	Thermo...	S & T...
Bessemer, B.	4,000	1,800	120	Solid...	34x3 1/2	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Thermo...	S & T...
Bessemer, A.	6,000	2,100	136	Solid...	34x4	34x5	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Thermo...	S & T...
Best, A.	1,000	750	78	Opt...	32x2	34x2 1/2	Under floor.	2	4.500x4.500	16.20	L-head...	Sep...	Head...	Gear...	Thermo...	Springs...
Blair, C.	4,000	2,850	114-21	Solid...	34x4	34x3*	Bet seats...	4	4.250x5.250	28.90	L-head...	Block...	Left...	Hel'l...	Pump...	Springs...
Blair, D.	5,000	3,250	121-44	Solid...	34x4	36x3 1/2*	Bet seats...	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Springs...
Blair, E.	7,000	3,750	135-44	Solid...	36x5	36x4*	Bet seats...	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Springs...
Brown.	1,500	1,650	122	Cush...	34x4 1/2	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Buckeye, V-1.	800	900	106	Pneu...	30x3 1/2	31x4	Under hood.	4	3.500x4.250	19.60	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Buckeye, V-2.	1,500	1,125	114	Opt...	35x3	35x3 1/2	Under hood.	4	3.750x4.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Buckeye, V-3.	3,000	1,900	120	Solid...	36x3 1/2	36x4	Under hood.	4	4.500x5.000	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Buckeye, V-5.	4,000	2,200	120	Solid...	36x4	36x5	Under hood.	4	4.500x5.000	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Buick, 3.	1,000	1,000	100	Pneu...	33x4 1/2	33x4 1/2	Under hood.	4	3.000x5.000	14.40	L-head...	Block...	Right...	Gear...	Thermo...	Rigid...
Buick, 4.	1,500	1,125	122	Pneu...	35x5	35x5	Under hood.	4	3.000x5.000	14.40	L-head...	Block...	Right...	Gear...	Thermo...	Rigid...
Butler, 1914.	1,500	1,650	126	Pneu...	35x4 1/2	35x4 1/2	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Cushions.
Chase, D.	1,000	855	106	Solid...	36x2 1/2	36x2 1/2	Under hood.	3	4.125x4.000		2-cycle...	Sep...			Air...	
Chase, K.	2,000	1,350	106	Solid...	36x2 1/2	36x3	Under hood.	3	4.125x4.000		2-cycle...	Sep...			Air...	
Chase, H.	2,000	1,200	106	Solid...	36x2 1/2	36x3	Under hood.	3	4.125x4.000		2-cycle...	Sep...			Air...	
Chase, L.	3,000	1,675	112	Solid...	36x3	36x3 1/2	Under hood.	3	4.500x5.000		2-cycle...	Sep...			Air...	
Chase, J.	4,000	2,100	120	Solid...	36x3 1/2	36x4	Under hood.	3	4.500x5.000		2-cycle...	Sep...			Air...	
Coleman, B.	2,000	1,950	107	Solid...	36x3 1/2	36x4	Under seat.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Coleman, C.	4,000	2,400	117	Solid...	36x4	36x3 1/2*	Under seat.	4	4.250x5.250	28.90	L-head...	Sep...	Left...	Gear...	Pump...	Springs...
Commerce, Del.	1,000	875	104	Solid...	32x3 1/2	33x4	Under hood.	4	3.000x4.500	14.40	L-head...	Block...	Right...	Gear...	Thermo...	Rigid...
Continental.	3,000	1,850	110	Solid...	36x3	40x3 1/2	Under hood.	4	4.000x	25.60					Pump...	
Corbitt, F.	2,500	2,000	130	Solid...	36x3 1/2	40x4	Under hood.	4	3.750x5.000	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Couple-Gear, A C T**	12,000	5,600	144	Solid...	36x5	36x5*	Under seat.	4	5.750x6.000	53.00	T-head...	Sep...	Opp...	Gear...	Pump...	Springs...
Couple-Gear, A C T**	12,000	5,550	144	Solid...	36x5	36x5*	Under seat.	4	5.750x6.000	53.00	T-head...	Sep...	Opp...	Gear...	Pump...	Springs...
Crown, B.	2,000	2,300	135	Solid...	34x3 1/2	38x5	Under hood.	4	4.000x5.000	25.60	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Crown, C.	4,000	3,000	150	Solid...	34x4	38x4*	Under hood.	4	4.250x5.000	28.90	T-head...	Pairs...	Opp...	Gear...	Pump...	Springs...
Croxton, Taxi.		1,800	121	Pneu...	36x4	36x4	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Left...	Gear...	Thermo...	Springs...
Danielson, A.	3,000	2,000	115	Solid...	36x3 1/2	36x4	Under seat.	4	4.250x4.250	28.90	T-head...	Sep...	Opp...	Gear...	Pump...	Springs...
Dart, B.	2,000	1,300	114	Solid...	36x3	36x3 1/2	Under hood.	4	4.063x4.500	27.10	L-head...	Block...	S & H...	Gear...	Pump...	Trunn'ns.
Dart, C.	4,000	1,775	130	Solid...	34x4	36x4	Under hood.	4	4.125x5.000	27.25	L-head...	Block...	S & H...	Gear...	Pump...	Trunn'ns.
DeKalb, D-2.	4,000	2,600	136-44	Solid...	36x4	36x3 1/2*	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Diamond, T J.	3,000	2,250	127-44	Solid...	36x3 1/2	36x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Diamond T, G.	6,000	3,350	144	Solid...	36x5	36x5*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Diamond T, G.	10,000	3,600	144	Solid...	36x6	36x6*	Under hood.	4	5.000x5.500	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Dispatch, 1914.	1,200	825	120	Pneu...	36x3 1/2	36x3 1/2	Under hood.	4	3.750x5.000	22.50	L-head...	Block...	Right...	Gear...	Thermo...	Rigid...
Dorris, Del.	1,500	2,100	132-44	Pneu...	35x4 1/2	35x4 1/2	Under hood.	4	4.375x5.000	30.63	L-head...	Pairs...	Head...	Gear...	Pump...	Rigid...
Dorris, 2-ton.	4,000	2,500	148	Solid...	34x3 1/2	36x3 1/2*	Under hood.	4	4.375x5.000	30.63	L-head...	Pairs...	Head...	Gear...	Pump...	Rigid...
Fargo, E.	1,500	800	86-100	Solid...	35x3	35x3	Under body.	2	4.500x6.000	16.20	L-head...	Sep...	Head...	Gear...	Thermo...	Rigid...
Federal, G H.		1,800					Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Flint, C.	1,600	1,370	106	Opt...	35x3	35x3 1/2	Under hood.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Hel'l...	Thermo...	Springs...
Four Wheel Drive, G**	3,000	3,600	124	Solid...	36x4	36x4	Under seat.	4	4.250x5.000	28.90	T-head...	Pairs...	Opp...	Gear...	Pump...	Trunn'ns.
Four Wheel Drive, B**	6,000	4,000	124	Solid...	36x6	36x6	Under seat.	4	4.750x5.500	36.10	T-head...	Pairs...	Opp...	Gear...	Pump...	Trunn'ns.
Gabriel, K.		1,000	106	Solid...	32x4	32x4	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Left...	Gear...	Thermo...	Rigid...
Gabriel, H.		1,500	126	Solid...	34x4 1/2	34x4 1/2	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
Gabriel, L.		2,500	154	Solid...	36x5	36x5*	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
Garford, L.	4,000	2,800	128	Solid...	36x5	40x3 1/2*	Under floor.	4	4.250x5.250	28.90	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Garford, J.	6,000	3,500	128	Solid...	36x5	40x4*	Under floor.	4	4.250x5.250	28.90	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Garford, K.	8,000	3,850	128	Solid...	36x5	40x5*	Under floor.	4	4.250x5.250	28.90	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Garford, D.	10,000	4,500	128	Solid...	36x6	40x6*	Under floor.	4	4.250x5.250	28.90	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Garford, F.	12,000	4,850	128	Solid...	36x6	40x7*	Under floor.	4	4.250x5.250	28.90	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Gay, F.	2,000	1,475	114	Solid...			Under hood.	4	3.750x4.500	22.50	L-head...	Pairs...	Left...	Hel'l...	Pump...	Springs...
Gay, G.	3,000	1,675	120	Solid...	36x3 1/2	36x4	Under hood.	4	4.000x4.500	25.60	L-head...	Pairs...	Left...	Hel'l...	Pump...	Springs...
G. V., F V.	12,000		169 1/2	Solid...	34x5	40x6*	Under hood.	4	4.250x5.900	28.90	L-head...	Pairs...	Head...	Gear...	Pump...	Trunn'ns.
Geneva, 2.	12,000	1,250	96	Solid...	34x2	36x2 1/2	Under hood.	2	5.125x4.500	21.00	L-head...	Sep...	S & H...	Gear...	Thermo...	Trunn'ns.
G. M. C., VC.	2,500	1,900	148 1/2	Solid...	34x3	36x5	Under hood.	4	3.500x5.250	19.60	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
G. M. C., SC.	4,000	2,600	143	Solid...	34x4	36x3 1/2*	Under hood.	4	4.000x6.000	25.60	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
G. M. C., H.	7,000	3,200	138	Solid...	36x5	36x4*	Under seat.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Ball Joint
G. M. C., HU.	7,000	3,500	156	Solid...	36x5	42x5*	Under hood.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Rigid...
G. M. C., KU.	10,000	4,500	156	Solid...	36x6	42x6*	Under hood.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Rigid...
G. M. C., KUL.	10,000	4,600	208	Solid...	36x6	42x6*	Under hood.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Rigid...
G. M. C., K.	10,000	4,250	138	Solid...	36x6	36x5*	Under seat.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Rigid...
B. A. Gramm, 1-ton.	2,000	1,750	130	Solid...	34x3 1/2	36x4	Under hood.	4	4.750x5.250	22.50	L-head...	Block...	Right...	Gear...	Pump...	Springs...
B. A. Gramm, 2-ton.	4,000	2,750	128	Solid...	36x4	36x3 1/2*	Bet seats...	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
B. A. Gramm, 3 1/2-ton.	7,000	3,600	140	Solid...	36x5	36x5*	Bet seats...	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
B. A. Gramm, 5-ton.	10,000	4,500	168	Solid...	36x6	36x6*	Under hood.	6	4.125x5.250	40.90	L-head...	Threes...	Right...	Gear...	Pump...	Springs...
Great Eagle, A.			145	Pneu...	37x5	37x5	Under hood.	4	4.750x5.000	36.10	T-head...	Pairs...	Opp...	Gear...	Pump...	Rigid...
Great Eagle, D.			145	Pneu...	37x5	37x5	Under hood.	6	4.500x6.250	48.60	T-head...	Pairs...	Opp...	Gear...	Pump...	Rigid...
Harvey, D.	3,000	1,875	130	Solid...	34x3 1/2	38x4	Under hood.	4	3.750x5.500	22.50	L-head...	Block...	Right...	Gear...	Pump...	Trunn'ns.

\*\*Drives on four wheels. †Gas-electric power plant.  
**ABBREVIATIONS:**—Tires: Pneu, pneumatic; \*, dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Expbd, expanding band; Con bd, contracting band.



## Capacity, Horsepower, Motor Accessories, Gear Ratio, Etc.



IGNITION			Carburetor	Motor Lubrication	Clutch Type	TRANSMISSION				Final Drive	RUNNING GEAR				BEARINGS		NAME AND MODEL
System	Magneto	Control				GEARSET			Gear Ratio on High		Front	Rear	CONTROL		Gearset	Rear Axle	
						Type	Location	No. Forw'd Speeds					Steering	Location Gear-Shift			
Sing.	Eisemann	Hand	Rayfield	Splash	Cone	Sel.	Unit J	3	7.42-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Ball	Bessemer, C
Sing.	Eisemann	Hand	Rayfield	Splash	Cone	Sel.	Unit J	3	6.50-1	Chain	Ell.	Plat.	Left.	Center.	Ball	Roll	Bessemer, B
Sing.	Eisemann	Hand	Rayfield	Splash	Cone	Sel.	Unit J	3	6.50-1	Chain	Ell.	Plat.	Left.	Center.	Ball	Roll	Bessemer, A
Doub.	Remy	Gov.	Marvel	Spl-Pres.		Fric	Amid.			Chain	Ell.	Ell.	Left.	Left.	Roll	Roll	Best, A
Sing.	Bosch	Fixed		Splash	Cone	Sel.	Amid.	3		T Worm	Ell.	Ell.	Right.	Right.		B & R.	Blair, C
Dual.	Bosch	Fixed		Splash	Cone	Sel.	Amid.	3		T Worm	Ell.	Ell.	Right.	Right.	Ball	B & R.	Blair, D
Dual.	Bosch	Fixed		Splash	Cone	Sel.	Amid.	3		T Worm	Ell.	Ell.	Right.	Right.		B & R.	Blair, E
Dual.	Mea.	Hand	Excelsior	Splash	Disk	Sel.	Unit M.	3		Int G.	Ell.	Ell.	Left.	Center.	Ball	Ball	Brown
Dual.	Briggs	Hand	Excelsior	Spl-Pres.		Fric			3.60-1	Chain	Ell.	Ell.	Right.	Right.		Ball	Buckeye, V-1
Dual.	Briggs	Hand	Schebler	Splash		Fric			3.00-1	Chain	Ell.	Ell.	Right.	Right.		Ball	Buckeye, V-2
Dual.	Briggs	Hand	Rayfield	Spl-pres.		Fric			3.00-1	Chain	Ell.	Ell.	Right.	Right.		Roll	Buckeye, V-4
Dual.	Briggs	Hand	Rayfield	Spl-Pres.		Fric			3.00-1	Chain	Ell.	Ell.	Right.	Right.		Roll	Buckeye, V-5
Dual.	Remy	Hand	Marvel	Splash	Cone	Sel.	Amid.	3		Bevel	Ell.	Ell.	Left.	Center.	Ball	B & R.	Buick, 3
Dual.	Remy	Hand	Marvel	Splash	Cone	Sel.	Amid.	3		Bevel	Ell.	Ell.	Left.	Center.	Ball	B & R.	Buick, 4
Sing.	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Amid.	3	5.06-1	Bevel	Ell.	Ell.	Left.	Center.	Ball	Roll	Butler, 1914
Sing.	Bosch		Holley	In fuel		Plan.	Amid.	2	3.00-1	Chain	Ell.	Ell.	Right.	Right.		Ball	Chase, D
Sing.	Bosch		Holley	In fuel	Disk	Sel.	Amid.	3	7.80-1	Chain	Ell.	Plat.	Right.	Right.		Ball	Chase, K
Sing.	Bosch		Holley	In fuel		Plan.	Amid.	2	3.00-1	Chain	Ell.	Plat.	Right.	Right.		Ball	Chase, H
Sing.	Bosch		Holley	In fuel	Disk	Sel.	Unit M.	3	8.60-1	Chain	Ell.	Plat.	Right.	Right.		Roll	Chase, L
Sing.	Bosch		Holley	In fuel	Disk	Sel.	Unit M.	3	8.60-1	Chain	Ell.	Plat.	Right.	Right.		Roll	Chase, J
Dual.	Remy	Hand	Schebler	Spl-Pres.	Cone	Sel.	Unit J	3		Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Coleman, B
Dual.	Remy	Hand	Schebler	Splash	Cone	Sel.	Unit J	3		Chain	Ell.	Plat.	Right.	Right.	Roll	Roll	Coleman, C
Sing.	Bosch	Fixed	Holley	Splash		Fric				Chain	Ell.	Ell.	Left.	Left.		Roll	Commerce, Del
Dual.	Bosch				Cone	Sel.		3	8.25-1	Chain	Ell.	Plat.					Continental
Sing.	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Amid.	3	8.00-1	Chain	Ell.	Ell.	Left.	Center.	Roll	Ball	Corbitt, F
Dual.	Mea.	Hand	Stromberg	Spl-Pres.						Int G.	Ell.	Ell.	Right.			Roll	Couple Gear A C T**
Dual.	Mea.	Hand	Stromberg	Spl-Pres.						Int G.	Ell.	Ell.	Right.			Roll	Couple Gear, A C T**
Sing.	Bosch	Fixed	Stromberg	Pressure	Cone	Sel.	Amid.	4		T Worm	Ell.	Ell.	Left.	Center.	Ball	Ball	Crown, B
Sing.	Bosch	Fixed	Stromberg	Pressure	Cone	Sel.	Amid.	4		T Worm	Ell.	Ell.	Left.	Center.	Ball	Ball	Crown, C
Sing.	Eisemann	Auto	Planhard	Splash	Disk	Sel.	Amid.	3		Bevel	Ell.	Ell.	Left.	Center.	Plain	Ball	Croxton, Taxi
Doub.	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J	3		Chain	Ell.	Ell.	Right.	Right.	Ball	Ball	Danielson, A
Sing.	Eisemann		Stromberg	Splash	Cone	Sel.	Amid.	3		Chain	Ell.	Ell.	Left.	Center.			Dart, B
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3		Chain	Ell.	Ell.	Left.	Center.			Dart, C
Sing.	Bosch	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3	7.13-1	Chain	Ell.	Ell.	Left.	Center.	Roll	Roll	De Kalb, D-2
Sing.	Bosch	Fixed	Rayfield	Spl-Pres.	Disk	Sel.	Unit M.	3		T Worm	Ell.	Ell.	Right.	Center.	Roll	Roll	Diamond T.J
Dual.	Bosch	Hand	Rayfield	Spl-Pres.	Disk	Sel.	Amid.	3		Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Diamond T.G
Dual.	Bosch	Hand	Rayfield	Spl-Pres.	Disk	Sel.	Amid.	3		Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Diamond T.G
Dual.	Splitdorf	Hand	Zenith	Pressure	Disk	Fric	Amid.		4.00-1	Chain	Ell.	Ell.	Right.	Center.	Ball	Ball	Dispatch, 1914
Sing.	Bosch	Hand	Flechter	Splash	Disk	Sel.	Unit M.	3	4.93-1	Bevel	Ell.	Plat.	Left.	Center.	Roll	Roll	Dorris, Del
Dup x	Bosch	Hand	Flechter	Splash	Disk	Sel.	Unit M.	3	7.65-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Dorris, 2-ton
Dual.	Lutz	Hand	Holley	Splash		Fric	Amid.		4.00-1	Bevel	Ell.	Plat.	Left.	Left.		Roll	Fargo, E
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Unit J	3	7.09-1	Chain	Ell.	Ell.	Left.	Center.	Roll	Roll	Federal, GH
Doub.	Remy	Hand	Marvel	Splash	Cone	Sel.	Amid.	3		Bevel	Ell.	Ell.	Left.	Center.	Roll	Ball	Flint, C
Sing.	Bosch	Hand	Stromberg	Spl-Pres.	Disk	Ind C.	Amid.	3	9.79-1		Ell.	Ell.	Right.	Right.	Ball	Ball	Four Wheel Drive, G**
Sing.	Bosch	Hand	Stromberg	Spl-Pres.	Disk	Ind C.	Amid.	3	8.90-1		Ell.	Ell.	Right.	Right.	Ball	Ball	Four Wheel Drive, B**
Sing.	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	4.00-1	Bevel	Ell.	Ell.	Left.	Center.	Roll	Ball	Gabriel, K
Sing.	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	4.25-1	Bevel	Ell.	Ell.	Left.	Center.	Roll	Roll	Gabriel, H
Sing.	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	4	5.50-1	Bevel	Ell.	Ell.	Left.	Center.	Roll	Roll	Gabriel, L
Dual.	Bosch	Hand	Own	Spl-Pres.	Cone	Sel.	Amid.	3	9.17-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Garford, I
Dual.	Bosch	Hand	Own	Spl-Pres.	Cone	Sel.	Amid.	3	10.74-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Garford, J
Dual.	Bosch	Hand	Own	Spl-Pres.	Cone	Sel.	Amid.	3	10.74-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Garford, K
Dual.	Bosch	Hand	Own	Spl-Pres.	Cone	Sel.	Amid.	4	13.31-1	Chain	Ell.	Ell.	Right.	Right.	Ball	Roll	Garford, D
Dual.	Bosch	Hand	Own	Spl-Pres.	Cone	Sel.	Amid.	4	15.63-1	Chain	Ell.	Ell.	Right.	Right.	Ball	Roll	Garford, F
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3	6.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	Gay, F
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3	7.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	Gay, G
Sing.	Bosch	Fixed	Own	Spl-Pres.	Cone	Sel.	Amid.	4	9.36-1	Int G.	Ell.	Ell.	Right.	Right.	Ball	Plain	G V., F V
Sing.	Bosch	Fixed	Schebler	Spl-Pres.	Disk	Plan.	Unit J	2	8.00-1	Chain	Ell.	Ell.	Right.		Ball	Ball	Geneva, 2
Sing.	Bosch	Hand	Kingston	Splash	Cone	Sel.	Amid.	3	8.65-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	G. M. C., VC
Sing.	Bosch	Hand	Kingston	Splash	Cone	Sel.	Amid.	3	8.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	G. M. C., SC
Doub.	Mea.	Hand	Holley	Splash	Disk	Prog.	Amid.	3	7.76-1	Chain	Ell.	Ell.	Right.	Right.	Ball	Roll	G. M. C., H
Doub.	Mea.	Hand	Holley	Splash	Disk	Prog.	Amid.	3	9.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	G. M. C., KU
Doub.	Mea.	Hand	Holley	Splash	Disk	Prog.	Amid.	3	12.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	G. M. C., HU
Doub.	Mea.	Hand	Holley	Splash	Disk	Prog.	Amid.	3	12.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	G. M. C., KUL
Doub.	Mea.	Hand	Holley	Splash	Disk	Prog.	Amid.	3	10.25-1	Chain	Ell.	Ell.	Right.	Right.	Ball	Roll	G. M. C., K
Sing.	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid.	3	7.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Ball	B. A. Gramm, 1-ton
Dup x	Bosch	Hand	Schebler	Splash	Disk	Ind C.	Amid.	3	8.30-1	Chain	Ell.	Ell.	Right.	Right.	Ball	Roll	B. A. Gramm, 2-ton
Dup x	Bosch	Hand	Schebler	Splash	Disk	Ind C.	Amid.	4	9.40-1	Chain	Ell.	Ell.	Right.	Right.	Ball	Roll	B. A. Gramm, 3-ton
Dual.	Bosch	Hand	Schebler	Splash	Disk	Ind C.	Amid.	4	11.90-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Roll	B. A. Gramm, 5-ton
Doub.	Eisemann	Hand	Rayfield		Cone	Sel.	Amid.	3		Bevel	Ell.	Plat.	Left.	Left.	Roll	Ball	Great Eagle, A
Doub.	Eisemann	Hand	Rayfield		Cone	Sel.	Amid.	3		Bevel	Ell.	Plat.	Left.	Left.	Roll	Ball	Great Eagle, D
Sing.	Eisemann	Auto	Holley	Splash	Cone	Sel.	Unit J	3	8.20-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Ball	Harvey, D

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor. Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Beve l, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels; Springs: Ell, semi-elliptic; Ell, elliptic; Ell, 1 elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.





# Specifications of 1914 American Commercial Vehicles, Including

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Horner, 1-ton	2,000	2,000	145	Solid	34x3 1/2	34x4	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Bumper
Horner, 2-ton	4,000	2,650	145	Solid	36x4	36x3 1/2	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Bumper
Horner, 1 1/2-ton	3,000	2,250	145	Solid	36x4	36x4	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Bumper
Horner, 3-ton	6,000	3,200	145	Solid	36x5	40x4	Under hood	4	4.500x3.500	32.40	L-head	Pairs	Left	Gear	Pump	Bumper
Horner, 5-ton	10,000	4,200	156	Solid	38x6	42x6	Under hood	4	5.250x5.750	44.10	T-head	Pairs	Opp	Gear	Pump	Bumper
Hupmobile, 32	800		106	Pneu	32x4	33x4	Under hood	4	3.250x5.500	16.90	L-head	Block	Left	Chain	Thermo	Rigid
Ideal, I	2,000	1,500	115	Solid	36x3	36x3 1/2	Under seat	4	3.750x4.500	22.50	L-head	Block	Left	Gear	Thermo	Springs
Ideal, H-2	3,000	2,000	124	Solid	36x3 1/2	36x4	Under seat	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Springs
Ideal, K	5,000	2,500	134	Solid	36x4	36x3 1/2	Under seat	4	4.500x5.500	32.40	L-head	Pairs	Left	Gear	Pump	Springs
International, MW	1,000		90	Solid	-x2	-x2	Under body	2	4.500x5.000	16.20	L-head	Sep	Head	Gear	Pump	Springs
International, MA	1,000		90	Solid	-x2	-x2	Under body	2	5.000x5.000	20.00	L-head	Sep	Head	Gear	Air	
Jeffery, 1514	1,500		120	Pneu	34x4 1/2	34x4 1/2	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Hel'l	Pump	Springs
Jeffery, 2014**	2,000		130	Solid	34x3 1/2	34x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Hel'l	Pump	Springs
Kalamazoo, B	3,000	1,590	110	Solid	36x3	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Kearns, A	1,500	850	100	Solid	36x2	36x2 1/2	Under hood	4	3.500x4.000	19.60	L-head	Pairs	Right	Chain	Pump	Trunnions
Kelly, K-30	2,000	2,000	120-44	Solid	36x3 1/2	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Right	Gear	Pump	Springs
Kelly, K-40	6,000		150-72	Solid	38x5	42x5	Under hood	4	4.500x6.500	32.40	T-head	Pairs	Opp	Gear	Pump	Springs
Kelly, K-35	4,000	2,750	144-20	Solid	36x4	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Side	Gear	Pump	Springs
Kelly, K-50	10,000	4,500	Op	Solid	38x6	40x6	Under hood	4	4.500x6.500	34.25	T-head	Pairs	Opp	Gear	Pump	Springs
King, 3	7,000	3,350	120	Solid	36x6	36x4	Under floor	4	4.500x5.500	32.40	L-head	Pairs	Left	Hel'l	Pump	Springs
Kieselkar, 2-ton	1,500	1,500	125	Pneu	34x4 1/2	34x4 1/2	Under hood	4	4.250x5.250	28.90	L-head	Pairs	Left	Chain	Pump	Springs
Kieselkar, 1-ton	2,000	1,850	140	Pneu	37x5	37x5	Under hood	4	4.500x5.250	32.40	L-head	Pairs	Left	Chain	Pump	Springs
Kieselkar, 1 1/2-ton	3,000	2,100	132	Solid	34x3 1/2	38x5	Under hood	4	4.250x5.250	28.90	L-head	Pairs	Left	Chain	Pump	Springs
Kieselkar, 2 1/2-ton	5,000	2,750	144	Solid	36x4	34x4	Under hood	4	4.500x5.250	32.40	L-head	Pairs	Left	Chain	Pump	Springs
Kieselkar, 3 1/2-ton	7,000	3,350	162	Solid	36x5	40x5	Under hood	4	4.875x5.000	38.00	L-head	Pairs	Left	Chain	Pump	Springs
Kieselkar, 6-ton	12,000	4,350	168	Solid	36x6	40x6	Under hood	4	4.875x5.000	38.00	L-head	Pairs	Left	Chain	Pump	Springs
Knickerbocker, 3-ton	4,000	3,750	120	Solid			Under seat	4	4.500x5.500	32.40	T-head	Pairs	Opp	Gear	Pump	Springs
Knickerbocker, 4-ton	8,000	4,000	120	Solid			Under seat	4	4.500x5.500	32.40	T-head	Pairs	Opp	Gear	Pump	Springs
Knickerbocker, 5-ton	10,000	4,500	134	Solid			Under seat	4	4.500x5.500	32.40	T-head	Pairs	Opp	Gear	Pump	Springs
Knox, R-3	4,000	3,000	145	Solid	34x4	34x4	Under hood	4	5.000x5.500	40.00	L-head	Sep	Head	Gear	Pump	Springs
Knox, Tractor	20,000	3,250	139	Solid	34x5	36x5	Under hood	4	5.000x5.500	40.00	L-head	Sep	Head	Gear	Pump	Springs
Knox, Tractor	40,000	3,750	140	Solid	34x5	38x6	Under hood	4	5.000x5.500	40.00	L-head	Sep	Head	Gear	Pump	Springs
Knox, Combination		4,100	145	Solid	40x5 1/2	40x5 1/2	Under hood	4	5.000x5.500	48.04	L-head	Sep	Head	Gear	Pump	Springs
Koehler, 1-ton	2,000	725	90	Solid	36x2 1/2	36x2 1/2	Under body	2	5.250x4.000	22.00	L-head	Sep	Side	Gear	Thermo	Springs
Kosmath, 1914	1,000	850	110	Pneu	32x3 1/2	32x3 1/2	Under hood	4	3.500x4.000	19.60	L-head	Pairs	Left	Gear	Pump	Springs
Krebs, E	1,000	950	100	Pneu	32x3 1/2	32x3 1/2	Under hood	4	3.500x4.000	19.60	L-head	Pairs	Left	Gear	Pump	Cushions
Krebs, BB	1,500	1,425	100	Pneu	34x4	34x4	Under hood	4	3.750x4.500	22.50	L-head	Block	Right	Gear	Thermo	Cushions
Krebs, AA	2,000	1,425	100	Solid	34x3	34x3	Under hood	4	3.750x4.500	22.50	L-head	Block	Right	Gear	Thermo	Cushions
Krebs, D & DD	3,000	1,775	118-44	Solid	36x3 1/2	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Right	Gear	Thermo	Cushions
LaFrance, 6-ton	12,000	5,500	144	Solid	36x5	38x6	Bet seats	4	5.500x6.000	48.40	T-head	Pairs	Opp	Gear	Pump	Springs
Landshaft, C	1,500	1,000	117	Solid	34x2 1/2	36x2 1/2	Under hood	4	3.000x4.500	14.40	L-head	Block	Right	Gear	Thermo	Springs
Landshaft, J	3,000	1,800	134	Solid	34x3 1/2	36x4	Under hood	4	4.125x5.250	27.25	L-head	Block	Right	Gear	Pump	Springs
Lange, C	2,000	2,250	125	Solid	36x3 1/2	38x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Hel'l	Thermo	Springs
Lange, B	4,000	3,000	136	Solid	36x4	38x3 1/2	Under hood	4	4.125x6.250	27.25	L-head	Block	Left	Hel'l	Thermo	Springs
Lauth-Juergens, K	2,000	2,100	Opt	Opt	Opt	Opt		4	3.800x5.300	23.25	L-head	Block	Left	Gear	Pump	Springs
Lauth-Juergens, L	4,000	2,800	Opt	Opt	Opt	Opt		4	3.800x5.300	23.25	L-head	Block	Left	Gear	Pump	Springs
Lauth-Juergens, M	6,000	3,450	Opt	Opt	Opt	Opt		4	4.800x5.000	37.00	L-head	Sep	Left	Gear	Pump	Springs
Lewis, 21	5,000	3,250	144	Solid	34x4	36x3 1/2	Optional	4	4.250x5.000	28.90	T-head	Pairs	Opp	Gear	Pump	S & T
Lewis, 21S	6,000	3,500	144	Solid	34x4	36x4	Optional	4	4.250x5.000	28.90	T-head	Pairs	Opp	Gear	Pump	S & T
Lewis, 51	10,000	4,750	144	Solid	36x6	38x6	Under seat	4	4.750x5.500	36.10	T-head	Pairs	Opp	Gear	Pump	S & T
Light, 800 lbs	800		66	Pneu	26x3	26x3		2	3.500x3.670	9.80		Sep		Gear	Air	
Lippard-Stewart, C	1,500	1,650	125	Pneu	35x4 1/2	35x4 1/2	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Lippard-Stewart, F	3,000	2,300	145-58	Solid	36x3 1/2	36x3 1/2	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Springs
Little-Giant, F	2,000	1,200	110	Solid	-x2 1/2	-x3	Under seat	2	5.000x4.000	20.00	L-head	Sep	S & H	Gear	Thermo	Rigid
Little-Giant, H	2,000	1,350	110	Solid	-x3	-x3 1/2	Under floor	4	3.750x5.500	22.50	L-head	Block	Right	Gear	Thermo	Springs
Locomobile, A	10,000	4,800	140-70	Solid	40x6	40x6	Under seat	4	5.000x6.000	40.00	T-head	Pairs	Opp	Gear	Pump	Springs
Longest, 3-A	8,000	4,000	144-72	Solid	36x5	36x5	Under hood	4	5.000x5.500	40.00	T-head	Pairs	Opp	Gear	Pump	Springs
Lord Baltimore, B	2,000	1,800	128	Solid	34x3 1/2	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Trunnions
Lord Baltimore, D	4,000	2,300	142	Solid	34x4	36x3 1/2	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Trunnions
Maccarr, A	1,500	1,650	120-32	Pneu	36x4 1/2	36x4 1/2	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Maccarr, B	2,000	1,900	Opt	Solid	36x4	36x5	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Maccarr, C	3,000	2,150	Opt	Solid	36x4	36x6	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Springs
Mack, 1-ton	2,000	2,000	Opt	Opt	Opt	Opt	Under hood	4	4.500x5.500	32.40	L-head	Pairs	Left	Chain	Pump	Rigid
Mack, 5-ton	10,000	4,000	Opt	Opt	Opt	Opt	Under hood	4	5.500x6.000	48.40	L-head	Pairs	Left	Chain	Pump	Rigid
Mais, C	3,000	2,750	119	Solid	36x4	36x5	Under hood	4	4.000x5.250	25.60	T-head	Pairs	Opp	Gear	Pump	Springs
Mais, D	3,000	2,800	132	Solid	36x4	36x5	Under hood	4	4.000x5.250	25.60	T-head	Pairs	Opp	Gear	Pump	Springs
Mais, E	4,000	2,950	132	Solid	36x4	36x4	Under hood	4	4.000x5.250	25.60	T-head	Pairs	Opp	Gear	Pump	Springs
Mais, F	4,000	3,000	145	Solid	36x4	36x4	Under hood	4	4.000x5.250	25.60	T-head	Pairs	Opp	Gear	Pump	Springs
Mais, G	5,000	3,200	145	Solid	36x4	36x4	Under hood	4	4.315x5.250	29.76	T-head	Pairs	Opp	Gear	Pump	Springs
Mais, H	6,000	3,400	160	Solid	36x5	36x5	Under hood	4	4.315x5.250	29.76	T-head	Pairs	Opp	Gear	Pump	Springs
Marmion, Delivery	1,500	2,500	120		32x4	32x4	Under hood	4	4.000x5.000	25.60	T-head	Pairs	Opp	Gear	Pump	Trunnions
Martin, B	3,000		140	Solid	36x3 1/2	40x4	Under hood	4	4.250x5.000	28.90	T-head	Pairs	Opp	Hel'l	Pump	Springs
Martin, S	3,000		121	Solid	36x3 1/2	40x4	Under seat	4	4.000x5.000	25.60	L-head	Block	Side	Hel'l	Pump	Springs

\*\*Drives on four wheels.

ABBREVIATIONS:—Tires: Pneu, pneumatic; \* dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.



## Capacity, Horsepower, Motor Accessories, Gear Ratio, Etc.



IGNITION			Carburetor	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			Clutch Type	GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset		Rear Axle
						Type	Location	No. Forw'd Speeds			Front	Rear	Steering	Location Gear-Shift			
Dual	Mea	Gov	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	6.80-1	Chain	1/2 Ell	Plat	Left	Center	Roll	Roll	Horner, 1-ton
Dual	Mea	Gov	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	9.43-1	Chain	1/2 Ell	Plat	Left	Center	Roll	Roll	Horner, 2-ton
Dual	Mea	Gov	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	7.79-1	Chain	1/2 Ell	Plat	Left	Center	Roll	Roll	Horner, 1 1/2-ton
Dual	Mea	Gov	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	9.40-1	Chain	1/2 Ell	Plat	Left	Center	Roll	Roll	Horner, 3-ton
Dual	Mea	Gov	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	13.42-1	Chain	1/2 Ell	Plat	Left	Center	Roll	Roll	Horner, 5-ton
Sing	Bosch	Hand	Zenith	Spl-Pres	Diak	Sel	Unit M.	3	3.86-1	Bevel	1/2 Ell	Cross	Right	Center	B & R.	Roll	Hupmobile, 32
Sing	Eisemann	Hand	Schebler	Spl-Pres	Cone	Sel	Amid	3	6.70-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Ball	Ideal, 1
Dual	Eisemann	Hand	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	6.70-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Ideal, H2
Dual	Eisemann	Hand	Stromberg	Spl-Pres	Diak	Sel	Unit M.	3	7.40-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Ideal, K
Doub	Heinze	Hand	Schebler	Spl-Pres	Con Bd			2		Chain	Ell	Ell	Right	Right	Roll	Roll	International, MW
Doub	Heinze	Hand	Schebler	Spl-Pres	Con Bd			2		Chain	Ell	Ell	Right	Right	Roll	Roll	International, MA
Dup'x	Bosch	Hand	Rayfield	Spl-Pres	Diak	Sel	Amid	3	4.00-1	Bevel	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Jeffery, 1514
Dup'x	Bosch	Hand	Rayfield	Spl-Pres	Diak	Sel	Amid	3	6.68-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Jeffery, 2014**
Sing	Bosch	Fixed	Kingston	Splash	Cone	Sel	Unit J	3		Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Kalamazoo, B
Doub	Remy	Hand	Schebler	Splash		Fric				Chain	Ell	Ell	Right	Right	Roll	Ball	Kearns, A
Sing	Eisemann	Auto	Breese	Spl-Pres	Cone	Sel	Amid	3	8.60-1	Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Kelly, K-30
Sing	Eisemann	Auto	Schebler	Spl-Pres	Cone	Sel	Amid	3	11.60-1	Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Kelly, K-40
	Eisemann	Auto	Splash	Cone	Sel			3		Chain	1/2 Ell	1/2 Ell	Left	Center			Kelly, K-35
	Eisemann	Auto	Splash	Cone	Sel			3		Chain	1/2 Ell	1/2 Ell	Left	Center			Kelly, K-50
Dual	Bosch	Fixed	Schebler	Spl-Pres	Diak	Ind C	Unit J	3	10.72-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	King, 3
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	5.00-1	Bevel	1/2 Ell	1/2 Ell	Left	Center	B & R.	Roll	Kisselkar, 2-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	5.00-1	Bevel	1/2 Ell	1/2 Ell	Right	Right	B & R.	Roll	Kisselkar, 1-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	4	8.07-1	Chain	1/2 Ell	1/2 Ell	Left	Center	B & R.	Roll	Kisselkar, 1 1/2-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	4	9.95-1	Chain	1/2 Ell	1/2 Ell	Left	Center	B & R.	Roll	Kisselkar, 2-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	4	11.00-1	Chain	1/2 Ell	1/2 Ell	Left	Center	B & R.	Roll	Kisselkar, 3-ton
Sing	Bosch	Hand	Stromberg	Spl-Pres	Cone	Sel	Amid	4	12.70-1	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Kisselkar, 6-ton
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Sel	Amid	3		Chain	1/2 Ell	1/2 Ell	Left	Left	B & R.	Roll	Knickerbocker, 3-ton
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Sel	Amid	3		Chain	1/2 Ell	1/2 Ell	Left	Left	B & R.	Roll	Knickerbocker, 4-ton
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Sel	Amid	3		Chain	1/2 Ell	1/2 Ell	Left	Left	B & R.	Roll	Knickerbocker, 5-ton
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit M.	3	5.34-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Knox, R-3
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit M.	3	10.95-1	Chain	1/2 Ell	1/2 Ell	Right	Center	Ball	Roll	Knox, Tractor
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Amid	3	12.11-1	Chain	1/2 Ell	1/2 Ell	Right	Center	Ball	Roll	Knox, Tractor
Doub	Bosch	Hand	Scott	Pressure	Diak	Sel	Unit M.	3	5.34-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Knox, Combination
Sing	Bosch	Fixed	Schebler	Pressure	Cone	Plan	Amid	2	7.00-1	Chain	1/2 Ell	Ell	Left	Center	Plain	Plain	Koehler, 1-ton
Sing	Swiss	Fixed	Opt	Splash	Cone	Sel	Unit M.	3	4.00-1	Bevel	1/2 Ell	Ell	Left	Center	B & R.	Roll	Kosmath, 1914
Sing	Bosch	Hand	Kingston	Splash	Cone	Sel	Unit M.	3	4.00-1	Bevel	1/2 Ell	1/2 Ell	Left	Center	B & R.	B & R.	Krebs, E
Sing	Bosch	Auto	Schebler	Splash	Cone	Sel	Amid	3	4.00-1	Bevel	1/2 Ell	1/2 Ell	Left	Center	Roll	Ball	Krebs, BB
Sing	Bosch	Auto	Schebler	Splash	Cone	Sel	Amid	3	6.40-1	Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Ball	Krebs, AA
Sing	Bosch	Auto	Schebler	Splash	Cone	Sel	Amid	3	7.80-1	Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Krebs, D & DD
2-Pt	Bosch	Hand	Schebler	Spl-Pres		Hyd				Chain	1/2 Ell	1/2 Ell	Right				LaFrance, 6-ton
Dual	Remy	Hand	Schebler	Splash	Diak	Plan	Amid	2	7.00-1	Chain	1/2 Ell	Plat	Right	Right	B & R.	Ball	Landshaft, C
Dual	Bosch	Hand	Rayfield	Splash	Cone	Sel	Amid	3	7.00-1	Chain	1/2 Ell	Plat	Right	Right	Roll	Roll	Landshaft, J
Doub	Connect	Hand	Stromberg	Spl-Pres	Diak	Ind C	Amid	3		Chain	1/2 Ell	1/2 Ell	Left	Center	B & R.	Roll	Lange, C
Doub	Connect	Hand	Stromberg	Spl-Pres	Diak	Ind C	Amid	3		Chain	1/2 Ell	1/2 Ell	Left	Center	B & R.	Roll	Lange, B
Doub	Opt	Hand	Stromberg	Splash	Diak	Sel	Amid	4		Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Ball	Lauth-Juergens, K
Doub	Opt	Hand	Stromberg	Splash	Diak	Sel	Amid	4		Chain	1/2 Ell	1/2 Ell	Left	Right	Ball	Ball	Lauth-Juergens, L
Doub	Opt	Hand	Stromberg	Splash	Diak	Sel	Amid	4	9.40-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Plain	Ball	Lauth-Juergens, M
Dual	Bosch		Rayfield	Splash	Diak	Sel	Amid	3	8.25-1	Chain	1/2 Ell	Plat	Right	Right	B & R.	Roll	Lewis, 21
Dual	Bosch		Rayfield	Splash	Diak	Sel	Amid	3	8.25-1	Chain	1/2 Ell	Plat	Right	Right	B & R.	Roll	Lewis, 21S
Dual	Bosch	Hand	Rayfield	Splash	Diak	Sel	Amid	3	9.45-1	Chain	1/2 Ell	Plat	Right	Right	B & R.	Roll	Lewis, 51
			Splash							Roller	1/2 Ell	1/2 Ell		Pedal			Light, 800 lb
Sing	Eisemann	Fixed	Rayfield	Spl-Pres	Cone	Sel	Amid	3	5.00-1	Bevel	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Lippard-Stewart, C
Sing	Eisemann	Fixed	Rayfield	Spl-Pres	Cone	Sel	Amid	3	7.75-1	T Worm	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Lippard-Stewart, F
Dual	Kingston	Hand	Holley	Splash	Diak	Sel	Amid	3	7.20-1	Chain	1/2 Ell	Ell	Left	Center	Ball	Ball	Little Giant, F
Dual	Kingston	Hand	Holley	Spl-Pres	Diak	Sel	Amid	3	7.20-1	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Little Giant, H
Dual	Bosch	Fixed	Own	Spl-Pres	Diak	Sel	Amid	4	10.40-1	Chain	1/2 Ell	1/2 Ell	Right	Right	B & R.	Roll	Locomobile, A
Dual	Bosch	Hand	Schebler	Pressure	Cone	Sel	Amid	4		Chain	1/2 Ell	1/2 Ell	Right	Right	Plain	Roll	Longest, 3-A
Sing	Eisemann	Fixed	Schebler		Diak	Sel	Unit M.	3		Int G	1/2 Ell	1/2 Ell	Left	Center			Lord Baltimore, B
Sing	Eisemann	Fixed	Schebler		Diak	Sel	Unit M.	3		Int G	1/2 Ell	1/2 Ell	Left	Center			Lord Baltimore, D
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit M.	3		Worm	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Maccarr, A
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit M.	3		Worm	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Maccarr, B
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit M.	3		Worm	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Maccarr, C
Dual	Bosch	Hand	Hoyt	Pressure	Diak	Sel	Amid	3	5.50-1	Chain	1/2 Ell	Plat	Left	Center	B & R.	Roll	Mack, 1-ton
Dual	Bosch	Hand	Breese	Spl-Pres	Cone	Sel	Amid	3	9.20-1	Chain	1/2 Ell	Plat	Right	Right	B & R.	Roll	Mack, 5-ton
Sing	Eisemann	Auto	Rayfield		Exp Bd	Prog			Opt	Int G	1/2 Ell	1/2 Ell	Left				Mais, C
Sing	Eisemann	Auto	Rayfield		Exp Bd	Prog			Opt	Int G	1/2 Ell	1/2 Ell	Left				Mais, D
Sing	Eisemann	Auto	Rayfield		Exp Bd	Prog			Opt	Int G	1/2 Ell	1/2 Ell	Left				Mais, E
Sing	Eisemann	Auto	Rayfield		Exp Bd	Prog			Opt	Int G	1/2 Ell	1/2 Ell	Left				Mais, F
Sing	Eisemann	Auto	Rayfield		Exp Bd	Prog			Opt	Int G	1/2 Ell	1/2 Ell	Left				Mais, G
Sing	Eisemann	Auto	Rayfield		Exp Bd	Prog			Opt	Int G	1/2 Ell	1/2 Ell	Left				Mais, H
Dual	Bosch	Hand	Stromberg	Pressure	Cone	Sel	Unit X	3	5.00-1	Bevel	1/2 Ell	Ell	Right	Right	Ball	Ball	Marmon, Delivery
2-Pt	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit J	3	6.75-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Martin, B
Doub	Bosch	Hand	Stromberg	Pressure	Diak	Sel	Unit J	3	7.95-1	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Martin, S

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch; Hyd, hydraulic. Gearset Location: Amid, amidships; Unit M, unit with the motor. Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: 1/2 Ell, semi-elliptic; Ell, elliptic; 1/2 Ell, 1/2 elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.





# Specifications of 1914 American Commercial Vehicles, Including

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Martin, A.	4,000	.....	155	Solid...	36x4	40x3½*	Under hood.	4	4.750x5.500	36.10	T-head...	Pairs.....	Opp.....	Hel'l.....	Pump.....	Springs...
Martin, E.	5,000	.....	132	Solid...	36x4	40x3½*	Under seat.	4	4.250x5.000	28.90	T-head...	Pairs.....	Opp.....	Hel'l.....	Pump.....	Springs...
Martin, L.	7,000	.....	145	Solid...	36x5	40x4*	Under seat.	4	4.750x5.500	36.10	T-head...	Pairs.....	Opp.....	Hel'l.....	Pump.....	Springs...
Menominee, A-3.	1,500	1,125	122	Solid...	32x3½	32x3½	Under hood.	4	3.750x4.500	22.50	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Rigid...
Menominee, B-3.	2,000	1,400	130	Solid...	34x3½	34x3½	Under hood.	4	4.000x5.000	25.60	L-head...	Pairs.....	Left.....	Gear.....	Thermo...	Springs...
Menominee, C.	3,000	1,800	130	Solid...	36x4	36x5	Under hood.	4	4.000x5.000	25.60	L-head...	Pairs.....	Left.....	Gear.....	Thermo...	Springs...
M & E, 4-ton.	8,000	2,750	114	Solid...	34x7*	40x6	Under seat.	4	4.125x5.250	27.25	L-head...	Pairs.....	Right.....	Gear.....	Pump.....	Springs...
Mercury, P.	1,000	.....	85	Solid...	38x2	40x2	Under floor.	2	4.250x4.000	14.50	L-head...	Sep.....	Side.....	Gear.....	Air.....	.....
Miller, A.	1,000	800	112	Pneu...	32x3½	32x3½	Under hood.	4	3.500x4.000	19.60	L-head...	Block....	Left.....	Gear.....	Pump.....	Rigid...
Modern, F.	1,500	1,500	136	Solid...	36x3½	36x3½	Under hood.	4	3.500x5.000	19.60	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Modern, G.	2,000	1,700	136	Solid...	36x3½	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Modern, H.	3,000	1,950	136	Solid...	36x3½	36x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Mogul, L.	4,000	2,360	133-44	Solid...	36x5	38x3½*	Under hood.	4	4.125x5.250	27.25	L-head...	Block....	Left.....	Hel'l.....	Pump.....	Springs...
Mogul, G.	4,000	2,750	120	Solid...	36x4	36x5	Under seat.	4	4.125x5.250	27.25	L-head...	Pairs.....	Left.....	Hel'l.....	Pump.....	Springs...
Mogul, O.	8,000	3,800	142	Solid...	36x6	40x5*	Under seat.	4	5.000x5.750	40.00	T-head...	Pairs.....	Opp.....	Hel'l.....	Pump.....	Springs...
Mogul, M.	12,000	4,700	155	Solid...	36x7	40x7*	Under seat.	4	5.250x5.750	44.10	T-head...	Pairs.....	Opp.....	Hel'l.....	Pump.....	Springs...
Mogul, U.	12,000	4,750	188	Solid...	36x7	40x7*	Under seat.	4	5.250x5.750	44.10	T-head...	Pairs.....	Opp.....	Hel'l.....	Pump.....	Springs...
Monitor, G.	1,000	1,050	110	Solid...	34x3	34x3	Under hood.	4	3.500x4.000	19.60	T-head...	Pairs.....	Opp.....	.....	Pump.....	Springs...
Monitor, D.	2,000	1,650	100	Solid...	34x3½	34x3½	Under seat.	4	3.750x5.000	22.50	T-head...	Pairs.....	Opp.....	.....	Thermo...	Springs...
Moon, A.	1,000	1,350	112	Pneu...	33x4	33x4	Under hood.	4	3.500x5.000	19.60	L-head...	Block....	Side.....	Gear.....	Pump.....	Rigid...
Moon, B.	3,000	1,800	125	Solid...	36x3½	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Side.....	Gear.....	Pump.....	Springs...
Moore, 1½-ton.	3,000	1,950	130	Solid...	36x3½	36x4	Under hood.	4	4.125x5.250	27.25	L-head...	Block....	Side.....	.....	Pump.....	Springs...
Moore, 2-ton.	4,000	2,500	160	Solid...	36x4	36x3½*	Under hood.	4	4.125x5.250	27.25	L-head...	Block....	Side.....	.....	Pump.....	Springs...
Moore, 3-ton.	6,000	3,150	142	Solid...	36x5	36x4*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs.....	Side.....	.....	Pump.....	Springs...
Moore, 4-ton.	8,000	3,900	Opt	Solid...	36x5	36x5*	Under hood.	4	4.750x5.500	36.10	L-head...	Pairs.....	Opp.....	.....	Pump.....	Springs...
Moore, 5-ton.	10,000	4,500	173	Solid...	36x6	42x5*	Under hood.	4	5.250x7.000	44.10	T-head...	Pairs.....	Opp.....	.....	Pump.....	Springs...
Mora, 24.	2,000	1,400	115	Solid...	36x2½	36x3	Under hood.	4	3.375x5.000	18.25	L-head...	Block....	Right.....	Gear.....	Thermo...	Trunn'ns.
Moreland, 1500-lb.	1,500	1,700	.....	.....	.....	.....	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Moreland, 2-ton.	4,000	2,350	120-44	.....	.....	.....	Under seat.	4	4.500x5.500	32.40	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Springs...
Moreland, 5-ton.	10,000	4,500	156-92	.....	.....	.....	Under seat.	4	5.250x7.000	44.10	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Natox, 15.	2,000	1,925	104	Solid...	36x3½	36x3½	Under seat.	4	3.500x5.000	19.60	L-head...	Block....	Side.....	Gear.....	Thermo...	Springs...
Nelson-LeMoon, D-1.	2,000	1,800	Opt	Solid...	37x3	37x4	Under hood.	4	3.750x5.250	22.50	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Rigid...
Nelson-LeMoon, D-2.	4,000	2,250	Opt	Solid...	37x4	37x4*	Under hood.	4	4.125x5.250	27.25	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Rigid...
Nelson-LeMoon, D-3.	6,000	2,750	Opt	Solid...	37x5	37x5*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Rigid...
Nevada, H**.	6,000	3,500	144	Solid...	36x6	36x6	Under seat.	4	4.500x6.750	32.40	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Springs...
New York.	.....	2,000	129	.....	.....	.....	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
O. K., A.	1,200	800	112	.....	32x3½	32x3½	Under hood.	4	3.500x4.250	19.60	L-head...	Pairs.....	Left.....	Gear.....	Pump.....	Springs...
O. K., 1-ton.	2,000	800	125	.....	34x3½	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Overland, 79.	800	.....	114	Pneu...	33x4	33x4	Under hood.	4	4.125x4.500	27.25	L-head...	Sep.....	Left.....	Gear.....	Thermo...	Trunn'ns.
Packard, 2-ton.	4,000	2,800	120-44	Solid...	34x3½	34x4	Under hood.	4	4.063x5.125	26.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Packard, 3-ton.	6,000	3,400	Opt	Solid...	.....	.....	Under hood.	4	4.500x5.500	32.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Packard, 4-ton.	8,000	3,550	Opt	Solid...	.....	.....	Under hood.	4	4.500x5.500	32.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Packard, 5-ton.	10,000	4,500	144-68	Solid...	.....	.....	Under hood.	4	5.000x5.500	40.00	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Packard, 6-ton.	12,000	4,650	120-68	Solid...	.....	.....	Under hood.	4	5.000x5.500	40.00	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Palmer-Meyer, 1-ton.	2,000	1,600	118	Solid...	34x3½	34x4	Under hood.	4	3.750x5.500	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Cushions.
Palmer-Meyer, 2½-ton.	3,000	1,975	130-44	Solid...	34x4	34x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Palmer-Moore, C.	1,600	1,350	102	.....	36x2½	36x3	Under hood.	3	4.000x4.000	.....	2-cycle.	Sep.....	.....	.....	Air.....	.....
Pathfinder, 1-ton.	2,000	.....	120	.....	.....	.....	.....	4	4.125x5.250	27.25	L-head...	.....	Side.....	Gear.....	.....	.....
Peerless, 3-ton.	6,000	3,700	151-74	Solid...	36x4	40x4	Under hood.	4	4.500x6.500	32.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Peerless, 4-ton.	8,000	4,000	151-74	Solid...	36x5	40x5	Under hood.	4	4.500x6.500	32.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Peerless, 5-ton.	10,000	4,500	151-74	Solid...	38x6	42x6	Under hood.	4	4.500x6.500	32.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Peerless, 6-ton.	12,000	.....	151-74	Solid...	38x7	42x7	Under hood.	4	4.500x6.500	32.40	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Perfex, 18.	1,000	875	116	Pneu...	31x3½	31x3½	Under hood.	4	3.375x4.000	18.25	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Rigid...
Pierce-Arrow, X-2.	4,000	3,000	150-80	Solid...	36x4	36x4*	Under hood.	4	4.000x5.500	25.60	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Trunn'ns.
Pierce-Arrow, R-5.	10,000	4,500	Opt	Solid...	36x5	40x6*	Under hood.	4	4.875x6.000	38.00	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Trunn'ns.
Pope-Hartford, 3-ton.	6,000	3,350	133½	Solid...	36x6	36x4*	Seat & hood	4	4.750x5.500	36.10	I-head...	Pairs.....	Head.....	Gear.....	Pump.....	Springs...
Pope-Hartford, 5-ton.	10,000	4,350	140	Solid...	36x7	42x6*	Seat & hood	4	4.750x5.500	36.10	I-head...	Pairs.....	Head.....	Gear.....	Pump.....	Springs...
Progress, A.	3,000	.....	.....	Solid...	36x3½	36x5	.....	4	4.125x5.250	27.25	L-head...	Pairs.....	Side.....	Gear.....	Pump.....	Springs...
Progress, B.	6,000	3,500	.....	Solid...	36x5	36x6	.....	4	4.500x5.500	32.40	L-head...	Pairs.....	Side.....	Gear.....	Pump.....	Springs...
Reo, J.	4,000	1,650	130-46	Solid...	36x4	36x3*	Under hood.	4	4.000x4.500	25.60	I-head...	Pairs.....	S & H.....	Hel'l.....	Pump.....	Rigid...
Rockford, 1500-lb.	1,500	1,500	126	Solid...	36x4½	36x4½	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...
Rockford, 2-ton.	4,000	2,500	128	Solid...	36x4	36x3½*	Under hood.	4	4.250x5.000	28.90	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Royal, A-5.	10,000	4,500	138	Solid...	36x6	40x6*	Under seat.	4	4.375x5.500	36.10	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Royal, B-3.	7,000	3,400	132	Solid...	35x5	40x5*	Under seat.	4	4.375x5.500	36.10	T-head...	Pairs.....	Opp.....	Gear.....	Pump.....	Springs...
Sandow, 1½-ton.	3,000	1,950	.....	.....	.....	.....	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Right.....	Gear.....	Pump.....	Rigid...
Sandow, 2-ton.	4,000	2,250	.....	.....	.....	.....	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Right.....	Gear.....	Pump.....	Rigid...
Sanford, K.	2,000	1,600	106	Solid...	36x3½	36x3½	Under seat.	4	4.000x4.500	25.60	L-head...	Pairs.....	Side.....	Gear.....	Pump.....	Springs...
Sanford, L.	3,000	1,910	118	Solid...	36x3½	36x4	Under seat.	4	4.000x4.500	25.60	L-head...	Pairs.....	Side.....	Gear.....	Pump.....	Springs...
Saurer, 6½-ton.	13,000	5,800	.....	.....	.....	.....	Under hood.	4	4.375x5.500	30.63	T-head...	Pairs.....	Opp.....	Chain....	Pump.....	Rigid...
S & S, A.	1,500	2,000	136	Solid...	36x4½	36x4½	Under hood.	4	4.125x5.250	27.25	L-head...	Block....	Left.....	Gear.....	Pump.....	Rigid...
Schacht, 2-ton.	4,000	2,650	139	Solid...	38x3½	40x3*	Under hood.	4	4.250x5.500	28.90	L-head...	Block....	Right.....	Gear.....	Pump.....	Springs...
Selden, J.	.....	2,000	.....	.....	.....	.....	Under hood.	4	3.750x5.250	22.50	L-head...	Block....	Left.....	Gear.....	Pump.....	Springs...

\*\* Drives on four wheels

**ABBREVIATIONS:**—Tires: Pneu, pneumatic; \* dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.



## Capacity, Horsepower, Motor Accessories, Gear Ratio, Etc.



IGNITION			Carburetor	Motor Lubrication	TRANSMISSION						RUNNING GEAR				BEARINGS		NAME AND MODEL
System	Magneto	Control			GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset	Rear Axle		
					Clutch Type	Type	Location			No. Forward Speeds	Front	Rear	Steering			Gear-Shift	
2-Pt. Doub. Doub.	Bosch	Hand	Stromberg	Pressure	Disk	Sel.	Unit J	3	6.60-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Martin, A
		Hand		Pressure	Disk	Sel.	Unit J	3	8.95-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Martin, E
		Hand		Pressure	Disk	Sel.	Unit J	3	9.10-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Martin, L
Dual	Remy	Hand	Schebler	Spl-Pres	Disk	Sel.	Unit M.	3	2.12-1	Bevel	Ell	Plat	Right	Center	Roll	Ball	Menominee, A-3
Dual	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3		Bevel	Ell	Plat	Right	Center	Roll	Roll	Menominee, B-3
Dup'x	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Unit M.	3	8.00-1	Bevel	Ell	Plat	Right	Center	Ball	Roll	Menominee, C
Dual	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Unit J	3	3.50-1	Chain	Ell	Ell	Right	Right		Plain	M & E, 4-ton
Dual	Remy	Fixed	Own	Spl-Pres	Disk	Plan	Unit M.	2		Chain	Ell	Ell	Right	Right	Plain	Roll	Mercury, F
Sing.	Opt	Fixed		Splash	Cone	Sel.	Unit M.	3		Bevel	Ell	Ell	Left	Center	Plain	Roll	Miller, A
Dual	Opt	Hand	Schebler	Splash	Cone	Sel.	Unit J	3	6.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Modern, F
Doub.	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J	3	7.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Modern, G
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J	3	9.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Modern, H
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid	3		Chain	Ell	Ell	Left	Center	Ball	Roll	Mogul, L
Dual	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Amid	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, G
Doub.	Mea	Hand	Stromberg	Splash	Disk	Prog	Amid	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, O
Doub.	Mea	Hand	Stromberg	Splash	Disk	Prog	Amid	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, M
Doub.	Mea	Hand	Stromberg	Splash	Disk	Prog	Amid	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, U
Doub.	Mich	Hand	Marvel	Splash	Cone	Sel.	Unit M.	3	8.00-1	Bevel	Ell	Ell	Left	Center	B & R	Roll	Monitor, G
Doub.	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	7.00-1	Bevel	Ell	Ell	Left	Center	B & R	Roll	Monitor, D
Dual	Remy	Hand	Stromberg	Splash	Cone	Sel.	Unit M.	3		Bevel	Ell	Ell	Left	Center	Ball	Ball	Moon, A
Dual	Remy	Gov	Stromberg	Splash	Cone	Sel.	Amid	3		Chain	Ell	Cross	Left	Center	Ball	Ball	Moon, B
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid	3	6.50-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 14-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid	3	6.50-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 2-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid	3	8.38-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 3-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid	3		Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 4-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid	4	9.82-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 5-ton
Sing.		Fixed	Stromberg	Splash	Disk	Plan	Amid	2	6.50-1	Chain	Ell	Ell	Left	Center	Ball	Ball	Mora, 24
	West'ce	Auto	Schebler	Splash	Disk	Sel.	Unit M.	3	5.10-1	T Worm	Ell	Ell	Right	Center	Roll	Roll	Moreland, 1,500 lb
	West'ce	Auto	Schebler	Splash	Disk	Sel.	Unit M.	3	7.75-1	T Worm	Ell	Ell	Right	Center	Roll	Roll	Moreland, 2-ton
	West'ce	Auto	Schebler	Spl-Pres	Sel.	Amid		4	10.50-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Moreland, 5-ton
Sing.	U & H	Fixed	Zenith	Pressure	Cone	Sel.	Unit J	3	7.97-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Nateco, 15
Sing.	Bosch	Fixed	Rayfield	Splash	Disk	Sel.	Unit M.	3	7.50-1	Chain	Ell	Ell	Right	Center	Roll	Roll	Nelson-LeMoon, D-1
Dual	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	8.50-1	Chain	Ell	Ell	Right	Center	Roll	Roll	Nelson-LeMoon, D-2
Dual	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	9.50-1	Chain	Ell	Ell	Right	Center	Roll	Roll	Nelson-LeMoon, D-3
Dual	Bosch	Gov	Holley	Spl-Pres	Cone	Sel.	Amid	3			Ell	Plat	Right	Right	Ball	Roll	Nevada, H
Sing.	Bosch	Fixed	Stromberg	Spl-Pres	Cone	Sel.	Unit J	3		Chain	Ell	Ell	Right	Right	Roll	Roll	New York
Sing.	Bosch		Opt	Splash	Cone	Sel.	Unit M.	3	4.00-1	Bevel	Ell		Left	Center	Plain	Roll	O. K., A & B
Sing.	Bosch		Opt	Splash	Cone	Sel.	Unit M.	3	8.50-1	Bevel	Ell		Left	Center	Plain	Roll	O. K., 1-ton
Dual	Spl'd'rf	Hand	Schebler	Splash	Cone	Sel.	Unit X	3		Bevel	Ell	Ell	Right	Center	Ball	Roll	Overland, 79
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 2-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 3-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 4-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 5-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 6-ton
Dual	Bosch	Gov	Schebler	Spl-Pres	Disk	Sel.	Unit M.	3	7.00-1	Chain	Ell	Ell	Right	Center	Ball	Roll	Palmer-Meyer, 1-ton
Dual	Bosch	Gov	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3	6.25-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Palmer-Meyer, 2-ton
Sing.	Bosch	Fixed	Own	In fuel		Plan	Amid	2		Chain	Ell	Ell	Right	Center	Roll	Roll	Palmer-Moore, C
Dual	Eisemann		Schebler	Spl-Pres	Cone	Sel.		3		Bevel	Ell						Pathfinder, 1-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid	4	7.47-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 3-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid	4	8.70-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 4-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid	4	10.50-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 5-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid	4	10.50-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 6-ton
Sing.	Spl'd'rf	Fixed	Stromberg	Splash	Cone	Sel.	Amid	3	4.00-1	Bevel	Ell	Ell	Left	Center	B & R	Ball	Perfex, 18
Sing.	Bosch	Fixed	Own	Pressure	Cone	Sel.	Amid	3		T Worm	Ell	Ell	Right	Right	Ball	B & R	Pierce-Arrow, X2
Doub.	Bosch	Hand	Own	Pressure	Cone	Sel.	Amid	3		T Worm	Ell	Ell	Right	Right	Ball	B & R	Pierce-Arrow, R5
Dual		Hand	Own	Spl-Pres	Cone	Sel.	Amid	4	11.00-1	Chain	Ell	Ell	Left	Center	Plain	Roll	Pope-Hartford, 3-ton
Dual		Hand	Own	Spl-Pres	Cone	Sel.	Amid	4	16.20-1	Chain	Ell	Ell	Left	Center	Plain	Roll	Pope-Hartford, 5-ton
Dual	Opt	Hand	Stromberg	Spl-Pres	Cone	Sel.	Amid	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Progress, A
Dual	Opt	Hand	Stromberg	Spl-Pres	Cone	Sel.	Amid	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Progress, B
Dual	Nat'l	Hand	Holley	Spl-Pres	Disk	Sel.	Amid	3	8.78-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Reo, J
Sing.	Pitt'd	Fixed	Stromberg	Splash	Disk	Sel.	Unit M.	3	5.00-1	Bevel	Ell	Ell	Left	Center	Ball	Roll	Rockford, 1500 lb
Sing.	Pitt'd	Fixed	Stromberg	Pressure	Cone	Sel.	Unit J	3	7.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Rockford, 2-ton
Sing.	Bosch	Auto	Stromberg		Disk	Ind C	Amid	3		Chain	Ell	Ell	Right	Right	Plain	Roll	Royal, A
Sing.	Bosch	Auto	Stromberg		Disk	Ind C	Amid	3		Chain	Ell	Ell	Right	Right	Plain	Roll	Royal, B-34
Sing.	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3		Chain	Ell	Ell	Right	Center	Roll	Roll	Sandow, 14-Ton
Sing.	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3		Chain	Ell	Ell	Right	Center	Roll	Roll	Sandow, 2-Ton
Dual	Remy	Gov	Schebler	Splash	Disk	Sel.	Unit M.	3	9.00-1	Chain	Ell	Plat	Right	Right	Ball	Roll	Sanford, K
Dual	Remy	Gov	Schebler	Splash	Disk	Sel.	Unit M.	3	9.00-1	Chain	Ell	Plat	Right	Right	Ball	Roll	Sanford, L
Sing.	Eisemann	Hand	Own	Pressure	Cone	Sel.	Amid	4	13.50-1	Chain	Ell	Ell	Right	Right	Ball	Ball	Saurer, 64-ton
Dual	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	4.50-1	Bevel	Ell	Ell	Right	Center	Ball	Ball	S. & S., A
Doub.		Hand	Schebler	Splash	Cone	Sel.	Amid	3		T Worm	Ell	Plat	Left	Center		Roll	Schacht, 2-ton
Dual	Briggs	Hand	Stromberg	Pressure	Disk	Sel.	Unit M.	3	7.82-1	Chain	Ell	Ell	Left	Center	Ball		Selden

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Eri, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: ½ Ell, semi-elliptic; Ell, elliptic; ¼ Ell, ¼ elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.





# Specifications of 1914 American Commercial Vehicles, Including

NAME AND MODEL	Load Capacity Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Service, J.	1,500	1,350	115	Solid...	36x3	36x3	Under hood.	4	3.750x5.500	22.50	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, K.	2,000	1,475	115	Solid...	34x3	34x3	Under hood.	4	3.750x5.500	22.50	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, M.	3,000	1,675	130	Solid...	34x3	34x4	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, Q.	3,000	1,800	145	Solid...	36x3	36x5	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, P.	4,000	2,375	150	Solid...	36x4	40x3	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, H.	6,000	2,975	171	Solid...	36x5	40x5	Under hood.	4	4.250x5.500	28.90	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Siebert, H.	1,500	1,250	118	Solid...	36x3	36x3	Under hood.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Hel'l...	Thermo...	Springs...
Signal, 1-ton.	1,500	1,350	115	Solid...	34x3	36x3	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
Speedwell, Y.	4,000	2,850	115	Solid...	36x4	36x3	Under seat.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Speedwell, Z.	8,000	3,750	115	Solid...	36x5	36x5	Under seat.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Speedwell, X.	12,000	4,400	139	Solid...	36x6	36x6	Under seat.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Standard, 3-ton.	6,000	2,750	Opt.	Solid...	36x5	36x5	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Right...	Gear...	Pump...	Cushions
Star, B.	2,000	1,500	120	Solid...	34x3	34x3	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Star, A.	3,000	1,800	130	Solid...	34x3	36x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Stearns, 5-ton.	10,000	3,800	144	Solid...	34x5	38x5	Under hood.	4	4.750x6.000	36.10	L-head...	Sep...	Right...	Chain...	Pump...	Springs...
Stearns, 5-ton.	10,000	3,900	180	Solid...	34x5	38x5	Under hood.	4	4.750x6.000	36.10	L-head...	Sep...	Right...	Chain...	Pump...	Springs...
Stegeman, 1-ton.	1,500	1,600	125	Pneu...	34x4	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 1-ton.	2,000	2,250	130-50	Solid...	34x3	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 2-ton.	4,000	2,950	142-62	Solid...	34x3	36x3	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 3-ton.	6,000	3,500	155	Solid...	36x4	40x4	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 4-ton.	8,000	3,950	155-75	Solid...	36x5	40x5	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Cradle...
Sternberg, 2-ton.	4,000	2,800	116-60	Solid...	34x4	36x3	Under seat.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 2-ton.	5,000	3,250	148	Solid...	36x4	38x4	Under hood.	4	4.250x5.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Rigid...
Sternberg, 3-ton.	6,000	3,400	130-60	Solid...	36x5	40x5	Under seat.	4	4.500x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 4-ton.	8,000	4,000	144	Solid...	36x5	40x5	Under seat.	4	4.500x6.750	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 5-ton.	10,000	4,500	144	Solid...	38x6	42x6	Under seat.	4	4.500x6.750	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 6-ton.	12,000	4,750	144	Solid...	38x6	42x6	Under seat.	4	4.750x6.750	36.10	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 7-ton.	14,000	5,000	144	Solid...	38x7	42x7	Under seat.	4	4.750x6.750	36.10	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Stewart, 1-ton.	1,500	1,500	125	Pneu...	34x4	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Stewart, 1-ton.	2,000	96	96	Solid...	36x3	36x3	Under hood.	2	5.00x5.500	20.00	L-head...	Block...	Left...	Hel'l...	Pump...	Rigid...
Studebaker, 1-ton.	1,500	1,050	106	Solid...	34x4	34x4	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Left...	Hel'l...	Pump...	Rigid...
Sullivan, 51.	2,000	1,050	120	Solid...	36x2	36x3	Under hood.	2	4.000x4.500	16.20	L-head...	Sep...	Head...	Gear...	Thermo...	Rigid...
Tiffin, A.	1,200	1,600	112	Opt...	34x3	34x3	Under hood.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Gear...	Thermo...	Springs...
Tiffin, G.	2,000	2,000	128	Solid...	36x3	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Tiffin, M.	4,000	2,600	140	Solid...	36x4	38x3	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Trabold, 1-ton.	1,500	975	105	Solid...	36x2	38x3	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Side...	Gear...	Thermo...	Trunn'ns
Trabold, C.	2,000	1,475	128	Solid...	36x3	38x4	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Right...	Gear...	Pump...	Trunn'ns
Trabold, 1 1/2-ton.	3,000	1,800	130	Solid...	36x3	38x4	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Right...	Gear...	Pump...	Trunn'ns
Trabold, 2-ton.	4,000	2,450	130	Solid...	36x4	38x4	Under seat.	4	4.250x5.500	28.90	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Transit, F.	4,000	2,850	144	Solid...	36x4	36x4	Under seat.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Transit, T.	7,000	3,500	144	Solid...	36x5	36x5	Under seat.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Transit, V.	10,000	4,500	144	Solid...	36x6	40x6	Under seat.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Twin City, 2-ton.	4,000	1,350	104	Solid...	34x3	36x3	Under seat.	2	5.000x5.000	20.00	L-head...	Sep...	Head...	Gear...	Thermo...	Springs...
Universal, C.	3,000	1,950	130	Solid...	34x3	34x5	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Right...	Opp...	Pump...	Springs...
Universal, A.	6,000	3,400	132-50	Solid...	36x5	38x4	Under hood.	4	4.000x5.500	25.60	L-head...	Pairs...	Right...	Opp...	Pump...	Springs...
U. S. E.	4,000	2,800	132	Solid...	35x3	37x3	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Hel'l...	Pump...	Springs...
U. S. D.	6,000	3,500	144	Solid...	35x5	37x5	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Springs...
Veerac, B.	2,000	1,100	86	Solid...	...	...	Under floor.	2	4.000x4.000	...	2-cycle...	Sep...	...	...	Air...	...
Velie, Y.	4,000	2,850	148-72	Solid...	36x4	36x4	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Velie, Z.	6,000	3,350	148-72	Solid...	36x4	36x4	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Vulcan, 2-ton.	4,000	2,750	144	Solid...	36x4	34x3	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns
Vulcan, 3-ton.	6,000	3,250	150	Solid...	36x5	34x4	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns
Vulcan, 4-ton.	8,000	4,000	162	Solid...	36x6	36x5	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns
Vulcan, 4-ton.	9,000	4,250	162	Solid...	36x6	36x5	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns
Vulcan, 5-ton.	10,000	4,500	162	Solid...	36x6	36x6	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns
Vulcan, 7-ton.	14,000	6,000	156	Solid...	36x7	42x7	Under hood.	4	4.750x5.500	36.10	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns
Wade, Delivery	800	400	72	Solid...	36x2	36x2	Under body.	1	4.500x6.000	8.10	L-head...	...	Left...	Gear...	Air...	...
Wagenhals	800	...	80	...	30x3	34x4	...	4	3,500x3.375	19.60	L-head...	Pairs...	Right...	Gear...	Pump...	Rigid...
Ware, A**.	...	3,000	Opt.	...	...	...	Under hood.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Trunn'ns
White, GBBE.	1,500	2,100	133	Pneu...	34x4	34x4	Under hood.	4	3.750x5.125	22.50	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
White, TBC.	3,000	3,000	145	Pneu...	36x4	36x4	Under hood.	4	3.750x5.125	22.50	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
White, GTA.	6,000	3,700	163	Solid...	36x5	40x4	Under hood.	4	3.750x5.125	22.50	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
White, TC.	10,000	4,500	165	Solid...	36x5	40x6	Under hood.	4	4.250x5.750	28.90	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
Wichita, A.	2,000	1,650	110	Solid...	34x3	34x4	Under hood.	4	3.250x5.000	16.90	L-head...	Block...	Left...	Gear...	Thermo...	Springs...
Wichita, B.	4,000	2,100	118	Solid...	34x3	34x3	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Left...	Gear...	Thermo...	Springs...
Wichita, H.	7,000	3,250	162	Solid...	36x5	36x5	Under hood.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Wilcox, L.	2,000	...	124	...	...	...	...	4	4.125x5.250	27.25	...	...	...	...	...	...
Wilcox, N.	4,000	...	118	...	...	...	...	4	4.250x4.500	28.90	...	...	...	...	...	...
Wilcox, JA.	6,000	...	128	...	...	...	...	4	4.250x5.000	28.90	...	...	...	...	...	...
Willys Utility, 65.	1,500	1,350	120	...	34x4	36x3	Under hood.	4	4.125x4.500	27.25	L-head...	Sep...	Left...	Gear...	Thermo...	Springs...
Willet, M.	1,500	1,650	125	Pneu...	34x4	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
Willet, L.	6,000	2,800	144-68	Solid...	36x4	36x4	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Zimmerman	...	...	...	...	...	...	Under hood.	2	4.750x4.000	18.00	L-head...	Sep...	S & H.	Gear...	Air...	...

\*\*Drives on four wheels.

ABBREVIATIONS:—Tires: Pneu, pneumatic; \*, dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.



## Capacity, Horsepower, Motor Accessories, Gear Ratio, Etc.



IGNITION			Carburetor	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			Clutch Type	GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset		Rear Axle
						Type	Location	No. Forw'd Speeds			Front	Rear	Steering	Gear-Shift			
Dual	Briggs	Hand	Stromberg	Splash		Fric			Chain	1/2 Ell	1/2 Ell	Left	Left		Ball	Service, J	
Dual	Briggs	Hand	Stromberg	Splash		Fric			Chain	1/2 Ell	1/2 Ell	Left	Left		Ball	Service, K	
Dual	Briggs	Hand	Stromberg	Splash		Fric			Chain	1/2 Ell	1/2 Ell	Left	Left		Roll	Service, M	
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3	Chain	1/2 Ell	1/2 Ell	Left	Center		Roll	Service, Q	
Sing.	Eisemann	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	Chain	1/2 Ell	1/2 Ell	Left	Center		Roll	Service, P	
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3	Chain	1/2 Ell	1/2 Ell	Left	Center		Roll	Service, H	
Sing.	Mea	Hand	Carter	Splash	Cone	Sel.	Unit J	3	Chain	1/2 Ell	Ell	Left	Center	Ball	Ball	Siebert, H	
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Unit J	3	7.50-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Signal, 1-ton	
Sing.	Eisemann	Auto	Schebler	Splash	Cone	Sel.	Amid.	3	9.36-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Speedwell, Y	
Sing.	Eisemann	Auto	Schebler	Splash	Cone	Sel.	Amid.	3	10.28-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Speedwell, Z	
Sing.	Eisemann	Auto	Schebler	Splash	Cone	Sel.	Amid.	3	10.28-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Speedwell, X	
Sing.	Eisemann	Auto	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3	8.95-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Standard, 3-ton	
Opt.	Opt.	Hand	Opt.	Splash	Disk	Sel.	Unit M.	3	8.50-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Star, B	
Opt.	Opt.	Hand	Opt.	Splash	Cone	Sel.	Unit J	3	8.50-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Star, A	
Dual	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel.	Amid.	4	9.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Stearns, 5-ton	
Dual	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel.	Amid.	4	9.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Stearns, 5-ton	
Sing.	Eisemann	Gov.	Carter	Spl-Pres	Disk	Sel.	Unit M.	3	Bevel	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Stegeman, 1-ton	
Sing.	Eisemann	Gov.	Carter	Spl-Pres	Disk	Sel.	Unit M.	3	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Stegeman, 1-ton	
Sing.	Eisemann	Gov.	Carter	Spl-Pres	Disk	Sel.	Unit M.	3	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Stegeman, 2-ton	
Sing.	Eisemann	Gov.	Carter	Spl-Pres	Disk	Sel.	Unit M.	3	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Stegeman, 3-ton	
Sing.	Eisemann	Gov.	Carter	Spl-Pres	Disk	Sel.	Unit M.	3	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Stegeman, 4-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	5.77-1 Chain	1/2 Ell	Plat.	Right	Right	Ball	Roll	Sternberg, 2-ton	
Sing.	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	7.75-1 T Worm	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Sternberg, 2 1/2-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	7.90-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 3-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	10.40-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 3-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	11.22-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 4-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	11.22-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 5-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	9.84-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 5-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	11.22-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 6-ton	
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel.	Amid.	3	11.22-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Sternberg, 7-ton	
Sing.	Bosch	Fixed	Mayer	Spl-Pres	Disk	Sel.	Amid.	3	Bevel	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Stewart, 1-ton	
Dual	Bosch	Fixed	Mayer	Spl-Pres	Disk	Plane		2	Bevel	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Stewart, 1-ton	
Dual	Remy	Hand	Schebler	Spl-Pres	Cone	Sel.	Unit X	3	4.60-1 Bevel	1/2 Ell	Ell	Left	Center	Roll	Roll	Studebaker, 1-ton	
Sing.	Bosch	Fixed	Schebler	Spl-Pres	Disk	Plan.	Unit J	2	Chain	1/2 Ell	Ell	Left	Center	Ball	Ball	Sullivan, 51	
Sing.	Bosch	Hand	Breeze	Splash	Cone	Sel.	Unit J	3	6.67-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Ball	Tiffin, A	
Sing.	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J	3	8.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Tiffin, G	
Sing.	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J	3	10.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Tiffin, M	
Dual	Briggs	Hand	Stromberg	Spl-Pres	Disk	Plan.	Unit J	2	7.50-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	Trabold, 1-ton	
Dual	Briggs	Hand	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3	8.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Trabold, C	
Dual	Briggs	Hand	Stromberg	Spl-Pres	Cone	Sel.	Unit J	3	8.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	Trabold, 1 1/2-ton	
Dual	Briggs	Hand	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3	8.50-1 T Worm	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Trabold, 2-ton	
Sing.	Mea	Hand	Rayfield	Splash	Disk	Sel.	Unit J	3	9.00-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Transit, F	
Sing.	Mea	Hand	Rayfield	Splash	Disk	Sel.	Unit J	3	10.74-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Transit, T	
Sing.	Mea	Hand	Rayfield	Splash	Disk	Sel.	Unit J	3	13.00-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Transit, V	
Sing.	K W	Hand	Schebler	Spl-Pres	Disk	Plan.	Unit J	2	10.00-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Ball	Twin City, 2-ton	
Dual	Eisemann	Hand	Zephyr	Splash	Disk	Sel.	Unit M.	3	T Worm	1/2 Ell	1/2 Ell	Left	Center	B & P	Roll	Universal, C	
Dual	Eisemann	Hand	Zephyr	Splash	Disk	Sel.	Unit J	3	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Universal, A	
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Ind C	Amid.	3	8.00-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	U. S., E	
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Ind C	Amid.	3	7.80-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Roll	U. S., D	
Doub.	Opt	Hand	Krice	In fuel	Disk	Plan.	Amid.	2	6.20-1 Chain	1/2 Ell	Ell	Left	Left	Ball	Ball	Veerae, B	
Dual	Bosch	Fixed	Stromberg	Splash	Disk	Sel.	Amid.	3	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Velie, Y	
Dual	Bosch	Fixed	Stromberg	Splash	Disk	Sel.	Amid.	3	Chain	1/2 Ell	1/2 Ell	Right	Right	Roll	Roll	Velie, Z	
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	7.90-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Vulcan, 2-ton	
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	7.90-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Vulcan, 3-ton	
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	7.90-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Vulcan, 4-ton	
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	7.90-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Vulcan, 4 1/2-ton	
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	3	7.90-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Vulcan, 5-ton	
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel.	Amid.	4	11.40-1 Chain	1/2 Ell	1/2 Ell	Right	Right	Ball	Roll	Vulcan, 7-ton	
Sing.	Wyc	Hand	Schebler	Splash	Disk	Sel.	Unit J	2	5.00-1 Chain	Ell	Ell	Right	Right	Plain	Plain	Wade, Delivery	
Dual	Spl'd'rf	Hand	Marvel	Splash	Cone	Plan	Unit M.	2	6.00-1 Chain	1/2 Ell	1/2 Ell	Center	Pedal	Roll	Roll	Wagenhaul	
Sing.	K W	Hand	Holley	Spl-Pres	Disk	Sel.	Amid.	3	Bevel	Ell		Right	Right	Roll	Roll	Ware, A**	
Sing.	Bosch	Hand	Own	Spl-Pres	Cone	Sel.	Amid.	4	Bevel	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	White, GBBE	
Sing.	Bosch	Hand	Own	Spl-Pres	Cone	Sel.	Amid.	4	Bevel	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	White, TBC	
Sing.	Bosch	Hand	Own	Spl-Pres	Cone	Sel.	Amid.	4	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	White, GTA	
Sing.	Bosch	Hand	Own	Spl-Pres	Cone	Sel.	Amid.	4	Chain	1/2 Ell	1/2 Ell	Left	Center	Ball	Ball	White, TC	
Opt.	Opt.	Hand	Opt.	Spl-Pres	Cone	Sel.	Unit J	3	7.32-1 Chain	1/2 Ell	1/2 Ell	Right	Center	Roll	Ball	Wichita, A	
Opt.	Opt.	Hand	Opt.	Spl-Pres	Cone	Sel.	Unit J	3	8.25-1 Chain	1/2 Ell	1/2 Ell	Right	Center	Roll	Ball	Wichita, B	
Dual	Bosch	Hand	Opt.	Spl-Pres	Cone	Sel.	Unit J	3	9.39-1 Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Wichita, H	
Dual	Mea			Splash	Cone	Sel.		3		1/2 Ell	1/2 Ell	Right	Center	Roll	Roll	Wilcox, L	
Dual	Bosch			Splash	Cone	Sel.		3		1/2 Ell	1/2 Ell	Right	Center	Roll	Roll	Wilcox, N	
Dual	Bosch			Splash	Cone	Sel.		3		1/2 Ell	Plat.	Right	Center	Roll	Roll	Wilcox, JA	
Dual	Spl'd'rf	Hand	Schebler	Splash	Cone	Sel.	Amid.	3	6.62-1 Chain	1/2 Ell	1/2 Ell	Right	Center	Ball	Roll	Willys Utility, 65	
Sing.	Eisemann	Auto	Zenith	Spl-Pres	Cone	Sel.	Amid.	3	Bevel	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Willet, L	
Sing.	Eisemann	Auto	Zenith	Spl-Pres	Cone	Sel.	Amid.	3	Chain	1/2 Ell	1/2 Ell	Left	Center	Roll	Roll	Willet, M	
Sing.	At Kent	Hand	Schebler	Spl-Pres		Plan.	Amid.	2	2.00-1 Chain	1/2 Ell	Ell	Right	Right	Plain	Ball	Zimmerman	

ABBREVIATIONS: Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: 1/2 Ell, semi-elliptic; Ell, elliptic; 2 Ell, 2 elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.



# Routes and Touring Information



LOOKING UP THE MISSISSIPPI FROM THE SITE OF FORT EDWARDS AT WARSAW, ILL., THE JUNCTION OF THREE STATES

## Tourists Will Find Spots of Historic Interest in Illinois

THE motorist who is not content alone with good roads and picturesque scenery, but who delights in the historical as well, will find a mine of riches in Hancock county, Illinois.

Warsaw and Nauvoo! What a tidal wave of memories is aroused when these two famous towns are brought to mind. Warsaw, located sentinel-like upon the bluffs of the mighty Mississippi, overlooks three states, Illinois, Iowa and Missouri, and opposite, the waters of the beautiful Des Moines, empty into the great stream that winds its sinuous way southward until it reaches the Gulf of Mexico.

The Illinois legislature has attracted attention to Warsaw by a recent appropriation of \$15,000 for a monument marking the site of Fort Edwards, which was erected about 1812 by General Zachary Taylor. The site of the fort is within the limits of the town but all trace of the stockade long since has disappeared.

When the British and Indians were encroaching upon the settlers of the middle west General Taylor decided upon a chain of forts to line the Mississippi. He selected the site now known as Warsaw and upon the bluff he erected Fort Edwards. The fort was in service for several years but finally was abandoned owing to the inability to keep a garrison and supplies. Warsaw was given its cue to exist by the presence of the ancient fort.

The view from the bluffs ranks with the finest to be found along the Mississippi. The Father of Waters is wide and deep at this point and the channel admits of the passage of the largest type of steamers. The motorist who follows the river will be tempted to halt when reaching Warsaw and gaze across the picturesque stream to the

rushing Des Moines and to the states of Iowa and Missouri on either side. After the visitor has become satisfied with the scenic view so broadly displayed, he should hasten to the city and visit the historic buildings.

At Warsaw is to be found the mansion of John Hay, secretary of state under President McKinley and who was the secretary also of Abraham Lincoln and biographer of the great emancipator. Hay attended school in his youth at Warsaw and the one-story brick structure where he learned his A B C's still is standing and, like the mansion, is pointed out with pride by the loyal citizen of Warsaw.

The main street of Warsaw contains a number of historical buildings, but the city depends upon the Hay homestead and schoolhouse and Fort Edwards for its principal arguments for fame. The monument upon the site of the old fort will be dedicated next spring. The Illinois Historical Society will be in charge.

Passing from Warsaw, the motorist should visit Nauvoo, situated at the head of the lower rapids of the Mississippi between Fort Madison and Keokuk. Nauvoo was founded by the Mormons in 1840 and its growth was rapid. After the expulsion of the "Saints" in 1846 it was settled by a colony of French Icarians who introduced the culture of grapes upon a large scale. They were a peculiar band of people, largely on the communistic order, but they failed to make good and gave way to another class, the majority of the population at present being of German extraction.

The chief industry of Nauvoo is horticulture, and the country is rich in agriculture. When the Mormons were at the height of their prosperity, the city con-

tained 16,000 souls and they became a power in state politics. Internal dissensions proved the undoing of the sect and Prophet Smith finally was arrested and placed in the jail at Carthage. On June 27, 1844, a mob attacked the prison and Smith and his brother were killed. Brigham Young then assumed the leadership and led the Mormons to Utah.

With the departure of the Mormons, Nauvoo declined. The site of the great temple is to be seen to this day and there are other attractions of a historical character for the motor tourist. The transcontinental tourist either using the Lincoln highway, the Burlington way or the other routes through central and northern Illinois, will find the detour to Warsaw and Nauvoo well worth the while.

## TAHOE HAS MOTOR ATTRACTIONS

To circle Lake Tahoe with a first-class road is one of the demands that has grown out of the great traffic to that spectacular California beauty spot during the few months of the year that the highways are open.

The name California in general suggests eternal sunshine and in the popular mind the world over it is associated nearly entirely with golden beams. Lake Tahoe, however, located at an altitude of 6,200 feet, in the very heart of the Sierra Nevada, is the greater time of the year in the grasp of a winter firmer than any of the eastern states. Twenty feet of snow on the level is the ordinary fall of a winter. Then the running of the railroad is discontinued and all transportation between it and Truckee, 12 miles away, is on snow shoes. A region hardly could witness a greater transformation than this same mountain lake section.



It is just such conditions as this that broke the heart of many a valiant pioneer in the days of gold. If they did not come across the mountains in this section during the warmer months they were in the gravest danger of being caught by the snow and hemmed in for months to endure the tortures of the Donner party, recently described in Motor Age.

During the brief period of summer, however, Lake Tahoe is one of the fairest

spots in the country. The lake is 25 miles long and 13 miles wide. It has erroneously been referred to as a filled-up extinct crater. That is absurd. It is simply a large valley, with the most rugged mountains on the east side in the state of Nevada. Snows of winter and many streams have filled this valley and the only outlet is the Truckee river, which flows out on the California side, and after wandering down the Truckee canyon and

by the town that also bears its name, it wends its way back to Nevada.

Fish abound in the crystalline waters of this altitudinous lake, which is so clear the bottom can be seen at a great depth. It is a lake of wondrous hues, as the shifting clouds in an atmosphere remarkably clear, result in unusual effects. These same clouds sometimes resolve themselves into real thunder storms of brief duration, but intensely spectacular.

A very fair road is maintained from the California side up the Truckee canyon to the Tavern. The motor car is a common sight at the Tavern and there is a large wooden garage that can accommodate about thirty cars. The opportunities for motoring are not the very best at present, although a start has been made that will mean greater delights in this section.

A fair road has been opened southward from the Tavern to Emerald bay, a distance of 12 miles as one follows the irregular shore line. A wilderness lies between that bay and Tallac, where connections can be made with the county highway that leads through Placerville. When the Indiana party was at Tahoe it took a barge at Meadowbrook, on the Nevada side, for the Tavern and was later similarly transported to Tallac. The Hoosiers did not go through California by way of the Truckee canyon, which leads directly past Donner lake, and through Emigrant gap, one of the most interesting sections from a historical viewpoint of any in the state, following, as it does, the unique snow sheds of the Southern Pacific a distance of 40 miles. The Placerville road, however, is the best. With the road opened to Tallac the motorist will be in a position to select a route. To barge a car across the lake is not most convenient.

According to the proponents of the lake it is stated that what has been accomplished for the road is only a starter. They plan to extend the road along the Nevada side and back to Tavern. With the many turns it would cover about 100 miles and it should be nearly level. In all events there need be no grades worth mentioning. The road naturally would keep close to the lake and one would have constantly changing glimpses of the magnificent body of water and with the progress of the day it would be found in intensely varying moods and of startling beauty.

Several camps have been established on the shore of the lake, connected by the first section of the road, but so far the Tavern is the only place that has provided accommodations for cars, so it is most popular with motorists.

## Bay State's Thriving Motor Business

### Report of Massachusetts Highway Commission

#### COMPARISON OF MOTOR STATISTICS IN MASSACHUSETTS FOR 1913 AND 1914

	1912 Cars	1913 Cars	Increase
Motor vehicles .....	50,132	62,660	12,528
Motorcycles .....	5,084	7,127	2,093
Makers and dealers .....	1,114	1,350	216
Operators' licenses .....	14,693	17,009	2,316
Chauffeurs' licenses .....	5,570	5,233	*337
Operators' renewals .....	32,255	40,858	8,603
Chauffeurs' renewals .....	14,127	17,934	3,807
Examinations .....	7,018	7,288	270
Duplicate licenses and certificates .....	2,112	2,946	834
Number plates, seals .....	.....	.....	.....
Miscellaneous .....	.....	.....	.....
Totals .....	.....	.....	.....
	1912 Receipts	1913 Receipts	Increase
Motor vehicles .....	\$492,482.50	\$616,133.00	\$123,640.50
Motorcycles .....	9,644.00	13,508.00	3,564.00
Makers and dealers .....	32,587.50	32,552.50	*35.00
Operators' licenses .....	29,386.00	34,018.00	4,632.00
Chauffeurs' licenses .....	11,140.00	10,466.00	*674.00
Operators' renewals .....	16,127.50	20,429.00	4,301.50
Chauffeurs' renewals .....	7,063.50	8,967.00	1,903.50
Examinations .....	14,036.00	14,576.00	540.00
Duplicate licenses and certificates .....	1,056.00	1,473.00	417.00
Number plates, seals .....	1,147.00	1,089.25	*57.75
Miscellaneous .....	1,580.94	10,941.76	9,360.82
Totals .....	\$616,245.94	\$764,153.51	\$147,907.57

\* Decrease.

BOSTON, Mass., Jan. 17—The fiscal year of the Massachusetts highway commission is just ended and it shows that there has been increase of about 25 per cent in the amount of business over that of 1912. The commission has taken in from motorists \$764,153.51. This is an increase of nearly \$150,000 over 1912.

There were 62,660 motor vehicles registered, an increase of 12,528 over last year. These totals do not include the cars of manufacturers and dealers, or motorcycles. Including these there were registered more than 76,000 vehicles. While the gain in both receipts and cars is greater this year, the percentage of gain is slightly less than that of last year over its predecessor, which was 29 per cent. There were 5,948 commercial vehicles registered this year, a gain of about 47 per cent over last year. The greatest gain this year is in the cars in the 20 to 30-horse-

power class. The owners of these cars pay more than twice as much as the owners of the 30-40-horsepower division. But in the number of cars registered the \$5 class for those under 20 horsepower leads all others.



ON THE SHORES OF PICTURESQUE LAKE TAHOE



# Detroit, Pittsburgh and Washington Stage 1914 Shows

## Wolverines Use Ford Building for Display of Both Passenger and Commercial Vehicles— Pull-More Truck, Front-Wheel-Drive Type, Makes its Appearance

**D**ETROIT, Mich., Jan. 19—For the thirteenth year, the people of the motor city are given an opportunity to view the new motor vehicles made in their midst as well as many which are not Detroit products. The Detroit Automobile Dealers' Association opened its exhibition on Saturday in the new Ford branch building with thirty-seven makes of gasoline motor cars on display, six electrics, fourteen commercial vehicles, six cyclecars and nineteen accessory makers. Of the predominating type of cars—the gasoline passenger class—nineteen are Detroit machines, while ten more are made in the state and the remaining eight are produced elsewhere. All but five of the trucks are Detroiters, while the entire half-dozen cyclecars, around which particular interest centers, are made in the city.

### Show Space At a Premium

Although the floor space of the present show is 30 per cent in excess of the amount which was ever available at the old show-place, the Wayne Gardens, it is said to be inadequate for the demand, several of the cyclecar makers being obliged to stay on the outside because they could not find space. The Wayne Gardens this year was unavailable for the exhibition, and the dealers' association was at a loss to know where to stage its annual affair until it hit upon the scheme of utilizing some of the space in the new mammoth Michigan assembling plant of the Ford company, located advantageously on the Detroit bou-

By L. V. Spencer

levard at the corner of Woodward avenue. Accordingly the Ford concern was approached and came to the rescue, offering three floors of the new part of the plant for the display.

### Light Cars Attract Attention

Among the passenger cars, no new models other than those which have been announced to the public within the past few months are to be seen, although there are five cars which were not exhibited at the Grand Central Palace in New York. These are the Ford, Paterson, Grant, Chevrolet and Monarch. The last named is a new Detroit car which is having its first show appearance, although it has been described some time ago. It is made by the Monarch company, of which R. C. Hupp is the moving spirit. It has the French type of sloping hood with radiator beneath.

Listed among the passenger cars are the three light cars—also comparatively new to the general public. These are the Grant, the Saxon and the Carnation, all of which sell at low figures. Detroiters seem very much interested in the cyclecars, judging from the crowds around them. On show are the LaVigne, Rocket, Mercury, Cricket, Hawk and Detroit. Most of these are put up for public scrutiny for the first time, although the first mentioned was an exhibitor at the late National show.

The Detroit display has the distinction of housing a parcelcar, that newest type

of delivery vehicle. This car is mounted on a Rocket cyclecar chassis and is a small closed delivery vehicle with the drive seat in front. Such a vehicle should have a great field among merchants who need a means of quick delivery of light articles of small bulk. This small vehicle has heavier rear springs than the regulation Rocket of tandem passenger type and is designed to carry 350 pounds of merchandise. It has a capacity of 38 cubic feet, and with standard equipment sells for \$395.

Although the most of the fourteen commercial cars on display are conventionally designed along the lines dictated by present day truck engineering practice, the Detroit show has brought to light a new design of commercial car which is a front-wheel-drive type. It is the Pull-more product of the Pull-More Motor Truck Co., Detroit. The newcomer has been in the process of development for over a year and its designers have waited for this exhibition to spring it. By placing the drive in front, the Pull-More is made a two-unit proposition, the front unit embodying the power plant and all driving mechanism being separate and independent of the carrying body. The latter unit is coupled to the power unit by a bridge iron reach, which operates on a hinged device located midway under the power unit.

### Details of the Pull-More

Another unique feature is the ability to get at all of the working mechanism very easily. The power plant, with transmission shaft and gearset in combination with it, is mounted over the front wheels and encased in a two-piece casting. The motor, bearings, gearset and in fact, all working parts, are mounted in the upper section of this, while the lower portion incorporates all the steering apparatus and the lubricating system. In order to get at all of the parts at once, one set of clamps which hold the two halves of the assembly are removed, and by a ratchet and screw device, the side from which the clamps have been taken is raised, the other side having hinges along split of the halves to make this possible. Of course, before this can be done, the propeller shafts running at right angles to the main driving shaft from the motor and which drive from the differential out to the chain sprockets, must be slipped out. A clever device permits of their easy engagement for driving or disengagement for removal.

From the driving sprockets, the chains run to the front wheel sprockets in the usual way. Since there is no driving mechanism in the rear unit, it is possible to make it low to the ground, the height of the platform being 28 inches. The car



THIRD FLOOR VIEW OF DETROIT SHOW



uses a 3¾ by 5½ motor, has a three-speed gearset, cone clutch, is mounted on 34 by 4 solids and the wheelbase is 117 inches. The Pull-More capacities are 1 ton and 2 tons, prices being \$1,800 and \$2,000 respectively.

Special interest attaches to the Ford exhibit, not so much on account of the presence of the well-known model T as on account of the case full of all of the previous models of motor vehicles which have borne the Ford name. These are all in miniature and carry the development up to the present type.

Besides this, there is a bulletin board in the Ford space, which gives hourly records of the production of model T motor production. This bulletin board records the actual number of motors turned out during each day of the show. At 2:30 p. m. today, the data stood as follows:

FORD MOTOR CO.		
Model T motor production.		
Total built to Jan. 19.....	422,302	
Today's actual hourly production		Totals
No. each hour		
8:00 a. m.....		
9:00 .....	125	255
10:00 .....	130	407
11:00 .....	152	555
12:00 .....	148	
12:00 to 12:30 (lunch).....		
1:30 .....	154	709
2:30 .....	144	853

On Saturday, the bulletin board showed a total of 1,125 engines made up to 4:30 o'clock or the end of the 8-hour shift to which the data refers.

#### Exhibitors Are Optimistic

Although it is still early in the week to make any definite statements as to the value of this year's show from the sales standpoint, it may safely be said that the exhibitors are an optimistic lot for the coming year. In fact, almost to a man, they predict a banner year ahead and are making preparations for it. With the show but 2 days' old, nearly every exhibitor has one or more sales already chalked up to the credit of the exhibition. One electric car maker has already closed up for three vehicles since Saturday. The light-car people and the cyclecar clans are happy, for it is a good omen, they say, the way the Detroiters, who of all known communities of motorists are naturally hard to please in a motor vehicle, have taken to their products.

Although it is primarily a dealers' exhibition, a Detroit show must of necessity include many exhibits of direct factory branches. Eleven of the thirty-seven makes of passenger cars are shown by the direct factory branches, all but two of the electrics are so exhibited and six of the commercials and all of the cyclecars are all Detroit made. Thus the show assumes a semi-dealer and semi-national aspect. The D. A. D. A. will be at home all week in Mr. Ford's Detroit branch.

#### W. H. RADFORD TO BUILD CARS

Detroit, Mich., Jan. 19.—W. H. Radford, formerly consulting engineer and factory manager of the Warren Motor Car Co., is working on designs for a light car of low price. A company will be organized.



TASTY DECORATIONS OF DETROIT SHOW, SECOND FLOOR

## Pittsburgh Show Most Attractive One

### Dealers Report Business Outlook Good

By H. A. Lane

PITTSBURGH, Pa., Jan. 19—Right in the heart of motordom and central to at least 5,000 cars owned by East End residents, the eighth annual show of the Automobile Dealers' Association of Pittsburgh opened Saturday night, in the immense Motor Square Garden in the East End. Green was the prevailing color. A great green canopy trimmed on the edges with white and red spread over the 100,000 square feet of floor space and set off to splendid advantage the dozens of rich looking cars. Eighty-five hundred people visited the show the opening night.

Of much interest to a large proportion of the visitors was the used car section in the basement where twenty second-hand machines were on display in charge of W. H. Lafontaine, a veteran show manager of this city. The new cars were all arranged on the first floor of the Garden alongside of broad aisles ready to be put into operation by means of a self-starter. The value of the line-up was estimated at \$2,000,000. A feature of it was the large number of crankless cars shown.

#### Prize for Oldest Car

Probably the most interesting feature of the show this week will be the contest among owners of old cars which will be pulled off today. A prize for the oldest car in the state has been offered by the show management and thirty entrants already have been announced. Some of the cars entered date from the '90's and the display is going to be well worth seeing.

It must be shown to the judges that the winning car has been in steady use since its purchase.

The show committee is composed of Ray McAllister, W. Murray Carr, W. N. Murray, L. C. Meyers, and Earl Kiser. Several members of this committee are veterans of the show business and this show proves the wisdom of leading experienced men managing these annual exhibits.

#### Pittsburgh Thoroughly Motorized

The growth in motor shows in Pittsburgh is symbolical of the rapid and steady advance in the popularity of the car here. In fact, the development of the motor industry in this city is one of the industrial phenomena of Greater Pittsburgh as the increase in the manufacture and distribution of motor cars here surpasses the progress in any other line of industry in this district and has contributed greatly to Pittsburgh's fame. When the first show was broached 8 years ago it was regarded as a joke. Few dealers had the courage to take an active hand in it. Spectators and visitors were comparatively few in number and a show buyer was almost unheard of. Now Pittsburgh boasts two big annual shows and the one just inaugurated at Motor Square Garden is the nearest to a perfect type of its kind that has ever been put on in Pennsylvania.

Pittsburgh now has 195 commercial garages, all well equipped for public service. Instead of one agency as there was in 1900, Pittsburgh now has forty-three





GENERAL INTERIOR VIEW OF BIG SHOW NOW RUNNING IN PITTSBURGH

dealers, each with an established agency. There are twenty-two legitimate dealers in motor trucks and five agencies for electric vehicle, namely the Detroit, Waverley, Baker, R. & L. and Ohio. In 1913 these five agencies sold fifty-six electric vehicles at an average price of about \$2,800. In the city there are now forty-five recognized supply houses.

#### Pittsburgh After Car Plants

Owing to Pittsburgh's peculiar geographical location and the fact that it supplies 45.7 per cent of the raw material used in the manufacture of the American-made motor car, special and successful efforts have been made the past 2 years to locate more car factories here. As a result of the efforts of the Pittsburgh industrial development commission the Duquesne Motor Car Co. is now manufacturing cars here; the Model Gas Engine Works moved its plant from Peru, Ind., to this city to make engines and the Pittsburgh branch of the Ford Motor Co., of Detroit, is now being built in this city. In addition to these plants the Lange Motor Truck Co. has been for several years successfully manufacturing motor trucks here.

The sales made the past year indicate that in spite of hard times the car business has held its own better than most any other line in this district. Most dealers reported last year's sales nearly or quite equal to those of 1912 and several concerns report a gain of from 10 per cent to 25 per cent. The gains were made chiefly in the sales of low-priced machines, that is, cars selling from \$600 to \$1,500. The high-class cars just about hold their own.

In motor trucks there was a very large gain in sales and especially in inquiries

which are likely to develop into deals this spring. The cars at the show this week prove the statements of dealers that there are more late models of passenger cars in Pittsburgh than in any other large city. The average Pittsburgher desires a brand new car and he is out in large numbers at Motor Square Garden trying to make up his mind what car he wants this spring.

Much credit is to be given to the Automobile Dealers' Association for promulgating motor enthusiasm in this city. It was formed in 1904 to cement the rapidly increasing number of motor firms into a mutual organization. It was incorporated in 1906. Each of its shows has shown a marked improvement over its predecessor. The association has been very active in securing good municipal regulations for motorists and especially in getting some vehicle state legislation passed at Harrisburg for the motor people.

#### Out-of-Town Dealers Attracted

The show this year is conspicuous for the large proportion of out-of-town visitors. Handsome invitations were mailed to hundreds of dealers in western Pennsylvania, eastern Ohio and West Virginia as well as to thousands of well known owners in the leading towns of tri-state territory. Responses from a large proportion of these were received last week. Many of the visitors were here the opening night of the show. Even the Billy Sunday meetings which draw crowds of from 15,000 to 22,000 are not sufficient to keep down the tendencies at the big East End show. Dealers reported 2 weeks ago that many agencies would be established and announced at the show as a number of concerns are preparing to extend their selling facilities considerably this year.

The officers of the association are: Wil-

liam N. Murray, president; Frank D. Saupp, vice-president; W. W. Bennett, treasurer; C. E. Vestal, secretary; directors, Earl Kiser, E. J. Thompson, R. P. McAllister, L. C. Meyers and W. Murray Carr.

General conditions in Pittsburgh are rapidly readjusting themselves in a way that will help sales this year. Business is getting steadily better. Resumption is the pass word on all hands in the steel industry. The coal mining business is still slack. As the steel mills, however, start up, it will necessitate more mining in a few weeks and with the opening of lake navigation it is expected that mining operations will be on again in full. There is no doubt that big gains will be made this year in the sales of cars costing not over \$1,000.

#### Farmers Are Good Prospects

The establishing of a Ford assembling plant here means thousands of Ford cars are going to be sold in tri-state territory this year. Dealers for other low priced cars are also reporting splendid inquiries, leaving little doubt as to their probable success in 1914. Of special interest in this connection is the large number of inquiries reported from farmers. The splendid advances in the building of good roads in which the Pittsburgh Automobile Dealers' Association has been most conspicuous has brought about a remarkable demand for cars in the country sections and the dealers who worked hardest for this legislation are now going to reap a harvest of sales.

#### CLEVELAND SHOW SELLS CARS

Cleveland, O., Jan. 7—More than 500 cars with a value exceeding \$1,000,000 were sold during the Cleveland Show at Wigmore coliseum, according to estimates made by the managers. Exhibitors claim the total will exceed these figures by far.



# President Wilson Opens the Show at Washington

## Display Most Creditable Despite Split in Dealers' Ranks

WASHINGTON, D. C., Jan. 19—When the president of the United States tonight pressed a button at the White House turning on the electric lights at Convention hall and thus opened the annual motor car show, the largest number of people that ever attended an event of this kind here gave vociferous approval of the fine exhibition of cars and accessories prepared for their inspection by the Washington Automobile Dealers' Association.

The motor car trade association did not exhibit and while the show was incomplete in this particular every space was occupied and the show started out tonight as though much business would be done. Nine factories that are not represented in Washington sent exhibits to the show with the expectation of landing a dealer. The cars are Hupmobile, Briscoe, Davis, Kline, Mitchell, Ohio electric, Regal, Winton and Imp cyclecar.

### Crowds Indicate Big Success

None of the previous shows held here have had finer decorations and despite the split in the ranks of the dealers, which has resulted in the formation of two organizations, the attendance tonight indicates the show will be a big success and will be productive of considerable business.

### By H. G. Ward

Many of the dealers here control territory in portions of Virginia and Maryland, while a few have a slice of West Virginia.

### Dealers Expect Good Year

It is a hard matter to get a line of what has been accomplished last year locally, as dealers are somewhat reticent in giving out information about their sales and as yearly licenses are not required here, no line can be obtained on the number of cars sold. However, it is safe to say that the year compared favorably with that of the 1912 season. What the current year will produce is, of course, problematical, but there is hardly a dealer who is not looking and who has not prepared for a larger volume of business than in 1913.

Cars selling for \$2,000 and under have the call here. There are several high-priced makes that are in favor, but as Washington is not a manufacturing town and the field for the high grade cars is rather restricted, it really is remarkable what the dealers in such cars have accomplished in the way of sales in the last few years.

One feature of the trade that is showing improvement all the time is the electric.

No city in the country offers better opportunity for the sale of electrics and Washington is forging to the front all the time as an electric town. The streets are wide and well paved, there are no hills of any consequence, and in a word the conditions for electric car users are ideal. Probably 800 of them are in use here at the present time and it is likely the thousand mark will be neared before the end of the present year.

### DISCO PROPERTY SOLD

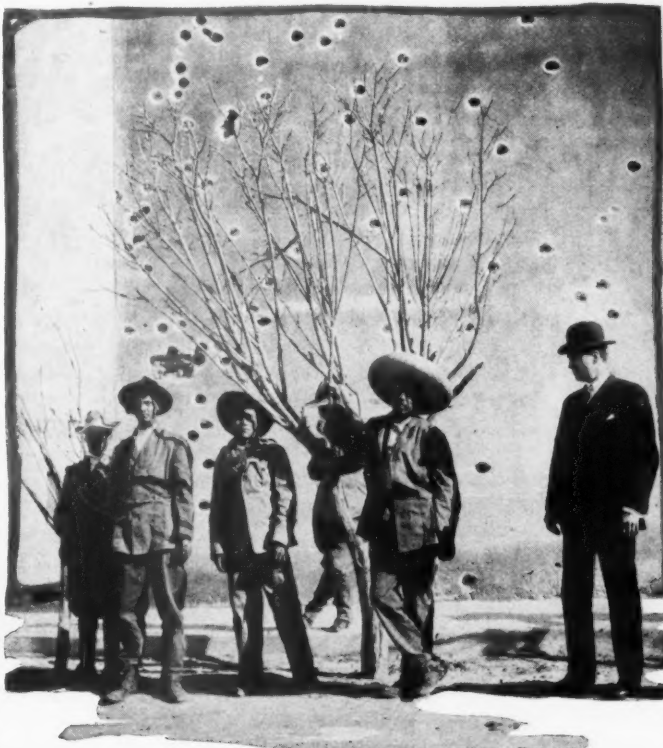
Detroit, Mich., Jan. 19—The bids on the Disco properties were reopened by the court on January 15 and several new bids were made. Mansell Hackett, of London, England, made a bid of \$27,600 which was approved by the court. The highest bid at the first sale was \$17,200. Part of the new bid was paid down and the remainder, covered by a bond, is to be paid within 90 days. Mr. Hackett is taking the business up where the Disco company left off and will operate it under the old name. He expects to specialize on a universal starter which may be attached to any car already in use. The cost of the regular type of starter will be considerably reduced.

## American Motor Car Manufacturer Visits Mexican Rebels at Juarez

HENRY M. Jewett and Henry Krohn, president and sales manager respectively of the Paige-Detroit Motor Car Co., of Detroit, now consider themselves qualified to write a brochure entitled, "Juarez, After the Battle Mother," and they have photographs—the accompanying illustration is made from one of them—to prove that they secured their information first-hand. While on a trip through the southwest, they stopped at El Paso, Tex., at the time the Mexican rebels took Juarez and were the first Americans to motor across the border and visit the terrorized town that has changed hands by force six times within the last 3 years. The driver of the taxicab that took them over into Mexico proved a valuable companion. He not only talked Spanish, but knew the officers of both armies, making interviews possible. Photographs also were secured. The one from which the accompanying illustration is made shows President Jewett and five rebels, just furnished with new suits and ammunition, standing

in front of a bullet-pitted residence only one-half a block from the barracks.

"You've got to hand it to these Mexicans for being game," said President Jewett in speaking of his experience in Juarez. "They're just as game as they are rough. We managed to get into the prison where the rebels held the federals captive. They told us that sixteen of their companions had been led out earlier in the morning to be shot and that they expected to meet the same fate before evening. But they weren't crying about it. That's just what they would have done to the rebels had the tables been reversed, so they expected this to happen to them. Neither side believes in or asks for mercy. Mexico isn't in a state of war. It is in a state of brigandage, nothing loftier than that. The first thing that strikes one is the utter lack of patriotism among the soldiers who don't know what they are fighting for. They are all of them, on both sides, out for plunder. Caranza and Villa are no better than any of the other leaders. They are out to get their hands on the public funds."



H. M. Jewett, president of the Paige-Detroit company, hobnobs with Mexican rebels at Juarez



# Two Miles Inside 1 Minute on Brooklands Speedway

## Hornsted in Benz Smashes More Records in England

LONDON, Jan. 15—Special cablegram—Hornsted in the big Benz formerly driven by Hemery, has succeeded in crowding 2 miles into the minute, the fourth time this feat has been performed in the annals of motoring and the first time it has been accomplished on a speedway. In a trial at Brooklands today Hornsted, with a flying start, succeeded in covering 2 miles in :57.99, equal to 122.05 miles per hour. This performance beats the :58% for 2 miles, made by Demogeot in the eight-cylinder Darraq at Ormond beach, Florida, U. S. A., on January 29, 1906, when W. J. Morgan staged his sensational 2-miles-a-minute race in which Demogeot defeated Marriott in a Stanley steamer. Marriott also succeeded in getting inside the 1-minute mark, his 2 miles being turned in :59%. The record, though, is :51.28, made by Burman in a Benz at Daytona, Fla., in 1911.

Hornsted also succeeded in beating the 5-mile flying start speedway record with 2:35.08, equal to 116.07 miles per hour. While this is the best track mark, yet it does not quite touch the 5 miles in 2:34, made January 24, 1906, at Ormond by Hemery in the eight-cylinder Darraq. In his trials today Hornsted had his Benz shod with Rudge-Whitworth wire wheels. The Benz has a four-cylinder motor with an 185-millimeter bore and 200-millimeter stroke. On December 22 it smashed the standing start kilometer record with :30.405, the average for two trials made both ways of the track, and the ½-mile standing start, which he turned in :25.545.

### MILWAUKEE TALKING ROAD RACE

Milwaukee, Wis., Jan. 19—The financial success of the show has renewed talk of another effort by Milwaukee dealers to run

the Vanderbilt and grand prix road races, possibly in 1915. With this in mind, George W. Browne, state agent for the Overland and Stutz, left immediately after the show for an extended trip to the west, during which he will see the Santa Monica events in February and lay wires for getting the classics for Milwaukee next year. The Milwaukee dealers are in a fair way of cleaning up all old debts and having something left to be the nucleus of a guarantee fund, and believe the powers that be will listen to their proposition. The Vanderbilt cup course has stood up so well through two winters that this much of the arrangements is well taken care of. In fact, the course is in better shape today than it has been at any time. It also is interesting to note that the expense of building the course was the principal reason for the large deficit incurred in the holding of the big road races in 1912.

# Motor Shows Prove Their Popularity

## Milwaukee and Philadelphia Report Results

MILWAUKEE, Wis., Jan. 19—The official attendance record of the sixth annual Milwaukee show, held in the Auditorium from January 10 to 16 inclusive, was 39,302. This is a gain of approximately 4,750 over the attendance at the 1913 show. The largest attendance was on Thursday, January 15, which was designated at society night, which brought out 7,196 persons.

As was the case a year ago, the net profits of the show will be applied to the payment of final debts incurred by the Milwaukee Automobile Dealers' Association in the conduct of the international road races at Milwaukee in October, 1912. The association arranged to make up the heavy deficit at any cost and in addition to moneys raised among members, the profits of the annual shows have been devoted to this purpose. It is said that the 1914 show just closed will make possible a payment of from \$10,000 to \$12,000 on the race account.

The association has already laid down the preliminary structure of the 1915 show, which will be held in the Auditorium from January 10 to 16, the dates being identical with the 1914 show dates which have proved successful ones.

Although it was believed that the show would attract large attendance to several conventions held during the period, it appears that the motor exposition was more attractive than the meetings. The Wisconsin Retail Automobile Dealers' Association adjourned without electing officers, and the

annual meeting of the Wisconsin State Automobile Association brought out the smallest attendance in its history. Only a dozen out-of-town delegates put in their appearance, but the Milwaukee delegation made quite a respectable showing.

Gratification is expressed in every quarter over the results of the show in a business way. It is conservatively estimated that not less than \$400,000 worth of business was done by dealers and accessory men, to say nothing of the prospects gained and influence obtained.

### Quaker Show Managers Jubilant

Philadelphia, Pa., Jan. 17—In point of attendance and most of all in volume of new business developed and consummated, the thirteenth annual motor car show which closed tonight classes as the most successful ever held in Philadelphia. Just how much new business directly traceable to the show has been done cannot be determined as yet. Direct sales are not the rule at these events, though many such were announced. But that future activity will be greater is clearly indicated by the increased lists of prospects and requests for demonstrations.

The accessories dealers crowded out of the Metropolitan building because of insufficiency of space conducted an independent show directly opposite and it was so successful that the companies represented are considering the advisability of making it a permanent exhibit. Here also was shown the Borland electric car and the Imp cyclecar.

### SANTA MONICA MAKING PLANS

Los Angeles, Cal., Jan. 16—At a meeting held yesterday in the office of Mayor Dudley at Santa Monica, the question of guarding the course for the Vanderbilt and grand prize races of February 21 and 23 was discussed. The city of Santa Monica has taken over the work of guarding the 8.2 miles and the matter has been placed in charge of Chief of Police Randall. More fences will be built than before and spectators will not be allowed within 200 yards of the Nevada avenue turn. The turn and the roadway for 200 yards on each side will be fenced off.

The curves will not be banked but much additional work will be done to make the turns even safer than before and all this will tend toward a faster course. The entire 8 miles will be resurfaced.

A grandstand will be erected to accommodate 20,000 people. There is a proposition to change the location of the stands. Last year they were located on the Ocean Front.

### TALK ROADS AT PURDUE

Indianapolis, Ind., Jan. 19—The most important road meeting held in Indiana in recent years was that at Purdue University, Lafayette, last Thursday. Men interested in good roads from all parts of Indiana attended. Among those who attended were representatives of chambers of commerce, county commissioners, good roads experts and more than half of the county road superintendents of the state. Resolutions were adopted asking that Governor Samuel M. Ralston appoint a committee to investigate road laws and road conditions with a view to preparing a bill creating a state highway department to be presented to the state legislature for consideration.



Another resolution adopted asked for legislation requiring county commissioners to take a 10 days' good roads' course at Purdue university each year. It was shown at the meeting that the townships and counties of the state have an aggregate road debt of \$33,000,000, which has been spent in a haphazard manner.

#### BAY STATE ELECTS OFFICERS

Boston, Mass., Jan. 19—At the annual meeting of the Bay State A. A. last week new officers were chosen to head the organization, the older ones having had enough of the worry trying to steer the club past financial shoals. W. H. Stevens was made president; J. J. McNamara, vice-president; and F. K. Swett, secretary-treasurer. The directors chosen were E. A. Gilmore, Chase Langmaid, Joseph Donovan, R. R. Ross and Dr. H. D. Boyd. As the club voted at a recent meeting to discontinue its headquarters at the Hotel Lenox because the rent was too high new quarters are being sought, and it is possible that rooms will be taken at the Hotel Oxford nearby. Great interest is being shown in the old organization and a membership boom is predicted.

#### CADILLAC FIRST INTO TACOMA PARK

Tacoma, Wash., Jan. 16—The annual contest between Tacoma motorists for the distinction of being first to get to Longmire Springs in the Mount Tacoma National park, took an unexpected turn the past year and instead of the snow keeping the cars out until the latter part of March or April, New Year's day found M. C. Davies in a Cadillac and Ethan Allen at the wheel of a Reo. Mr. Davies will receive the first 1914 park permit. The majority of motorists in the northwest now are calling the mountain Mt. Tacoma, although it is noted on the maps as Mt. Rainier.

## Secessions from the A. A. A. Reported

### Connecticut and Cincinnati Withdraw

HARTFORD, Conn., Jan. 17—At the annual meeting of the Connecticut Automobile Association held in New Haven this week it was voted to withdraw from membership in the American Automobile Association. It is claimed that Connecticut has not had proper representation and that the dues are out of proportion to the benefits derived.

An officer of the state association when interviewed on the subject said, "Connecticut pulled out because the A. A. A. is run by manufacturers for the benefit of the manufacturers of motor cars and patent roads. The idea that is extant now is that a lot of clubs not now affiliated with the A. A. A. will get together and form a purely amateur association for the exchange of touring information and mutual aid in obtaining sane legislation and insurance rates on motor cars, a business and protective organization."

"The under-current in this state started several years ago. Federal registration was the only piece of legislation the A. A. A. did in the past 3 or 4 years. The Connecticut Automobile Association voted unanimously against the bill. Connecticut, Ohio and Illinois kickers killed the bill."

Asked what would become of the state association the official mentioned said, "We will keep the same organization. The federation of clubs will be along purely amateur lines. The money formerly paid by the state association to the A. A. A. will be used for signs."

A. G. Batchelder, chairman of the board of directors of the national body is to speak in this city next Wednesday evening at the annual meeting of the Automobile Club of Hartford and will present the na-

tional body's side of the controversy. The association elected the following officers at the annual meeting: President, J. M. Emerson, of Ansonia; vice-president, F. Spencer Goodwin, of Hartford; secretary, Charles Marcy Robinson, of New Haven; treasurer, F. C. Howe, of New Haven.

#### Cincinnati Club Secedes

Cincinnati, O., Jan. 17—The Cincinnati Automobile Club has withdrawn from affiliation with the A. A. A. and also the Ohio State Automobile Association because of the Dr. A. B. Heyl incident. This action was taken at a meeting held January 14. Dr. A. B. Heyl, an active member of the Cincinnati club was censured for an attack published in a Cincinnati newspaper on the policy of the officers of the A. A. A. The reason for withdrawing from the Ohio State Automobile Association is that its president, C. C. Janes, refused to defend Dr. Heyl before the Richmond meeting.

#### ILLINOIS CONVICTS MAKE GOOD

Dixon, Ill., Jan. 17—The honor men from the state prison at Joliet, who have been in camp at Camp Hope, near Grand Detour, roadmaking for the state and township, will have completed their work on the mile of road and be returned to Joliet next week. The forty-five who, on September 3 of last year, were placed on their honor by Warden Allen and without guards sent to the camp to work in the open like free men, will return with a clear record, having "made good." Of the first forty-five convicts in camp, fifteen have served out their terms and been released since coming here.

## Falcon Finishes Strenuous Test Through Five States

### Cyclecar Travels 626 Miles Under Trying Circumstances

STAUNTON, Va., Jan. 16—After a most severe and conclusive test the Falcon cyclecar arrived in Staunton on Friday, January 9, at 7:30 p. m., having been driven on a five-state tour from Cleveland via Pittsburgh, Cumberland and Hagerstown to the Virginia city, where the Falcon Cyclecar Co.'s plant is now being equipped. It covered 626 miles on the trip, the longest journey made by an American cyclecar.

In charge of the trip was Bryce E. Blackley, formerly with the Ohio Motor Car Co. He was accompanied by George F. Cox, of Cleveland, and carried messages from Mayor Newton D. Baker and Secretary Fred H. Caley, of the Cleveland Automobile Club, to the mayor and city council of Staunton.

The Falcon at the start only was a skeleton of a car, the canvas hood lightly supported by sheet steel braces covering the engine and without body, top or windshield or fenders to protect the men in the bucket seats.

Bedford, O., where the drivers spent the first night, was reached in a couple of hours and the following morning the car was driven to Hudson over very muddy roads. Near Hudson the first mechanical mishap of the trip occurred in a deep mud hole, where a frame strut-rod broke and was replaced temporarily by a cable with a loss of an hour for repairs. The car went on to Ravenna, passing on the way two 5-ton trucks in the ditch. A seven-passenger touring car having trouble on a hill, one five-passenger touring car with

a broken axle and several smaller cars that had failed to keep the track and were mired by the roadside. During this stretch every car met had chains all around. At no time on the trip did the Falcon carry or use chains.

At this point the roads were covered with sandy slime and since the fenders had not been fitted to the car, the front wheels threw a steady stream over the drivers which added greatly to the difficulties of driving and finally, obscuring the headlights, caused the car to leave the road for a deep snow drift from which it took several hours' work to dig the car out of the barrier.

By 9 o'clock Alliance, O., was reached where both car and driver were unrecognizable with plastered mud. From Alliance



the following morning the Falcon bucked snow to Washingtonville over scarcely broken roads, finally running short of gasoline near Leetonia. A rescue party brought out supplies and the car arrived at 10 p. m. on New Year's day. At Leetonia it was possible to secure suitable material to replace the temporary

sticky snow here caused the first belt trouble of the trip into the rear pulley until finally one belt broke. In attempting to negotiate a badly drifted hill the second belt broke and the pair which replaced those gave almost no trouble until the end of the tour.

At this point the 36-inch tread proved



FALCON PLUGGING THROUGH SNOW

cable strut, and just as a blinding snow storm commenced, the start was made late in the afternoon of January 7, for Columbiana.

It was decided, in spite of the storm, to pass through this town, which was reached at 10 o'clock at night, but carbureter trouble just east of town which could not be located in the darkness and thickly falling snow caused the car to turn back, reaching the garage at 1 a. m. on Saturday morning, January 3.

#### Marooned by Blizzard

During Friday night and Saturday 12 inches of snow fell and by Saturday morning all telephone and telegraphic communication had ceased, with the result that every effort to locate the marooned drivers either from Cleveland or Pittsburgh was useless.

By the time carbureter adjustments were made on Saturday the storm was so heavy that the driver did not dare to start over unknown roads and finally after attempting in every way to get a message to the Cleveland office of the Falcon company or to Mr. Hoyt, the designer of the car, who was at Pittsburgh, the drivers took the train for the latter city, spending Sunday in rest, with the snow falling continuously.

Returning to Columbiana Sunday night Mr. Hoyt and the drivers decided to go ahead in spite of the unfavorable prospects and started for Beaver Falls on the morning of the 6th, breaking their own roads over 4 miles with snow level with the floor board of the car. The wet



FALCON AFTER CROSSING SNOW STREAM IN MARYLAND

its versatility by following bob-sled tracks through deep and unbroken snow for more than 30 miles. The wheels exactly fitted the ruts and the car made good time for what otherwise would have been an impassable snow pile to Beaver Falls. From here to Pittsburgh a fairly well beaten macadam road was found and the garage was reached at 4 a. m. on the morning of the 6th.

From Pittsburgh to Meyersdale, to which Blackley and Cox took the car, the mountain roads were found to be in fairly good condition with the exception of frozen snow, which was exceedingly rough in spots. At Meyersdale Blackley collapsed from exhaustion and returned to Pittsburgh by train. Hoyt relieved him, and by driving all Tuesday night, arrived at Hagerstown at 4 in the morning, where the drivers rested until 9 a. m. Wednesday. At this point the travelers reached the National valley pike, famous throughout the country for its splendid surface, and excellent time was made to Winchester.

#### Fording Snow Streams

The amphibious qualities of the Falcon were shown when it forded several snow streams which crossed the pike, and about

12 miles of freshly ballasted road, covered with large fragments of crushed rock gave the tires the most extreme test of the trip.

Winchester was reached at 1 o'clock and after telephoning to Staunton, the car started at 2 o'clock for Harrisonburg. Between these points the only bad traveling on the pike was found, the surface being covered with the same kind of slimy mud that had been experienced near the beginning of the trip. Harrisonburg was finally reached at 12:20 a. m. on Friday morning.

On leaving Harrisonburg the following day at noon the tourists entered a perfect stretch of road, clean, dry macadam. Down a grade on an S turn they flashed, and without warning hit a sunken railroad track. The right spindle, which was found on examination to contain two blow-holes, snapped, and the car plunged forward across the road and into the ditch. Its low center of gravity but primarily its pivoted front axle suspension, unquestionably saved the car and the lives of its drivers.

#### Entry Into Staunton

The crowds which had thronged the streets in Staunton all afternoon had almost disappeared when the procession entered the city, unheralded at 7:30 o'clock in the evening of January 9. Proceeding to the Virginia hotel it was met by Mayor Hampton Wayt, who received the messages which the drivers carried. Then to the delight and amazement of the crowd, the doors of the hotel were opened and the car driven into the lobby and backed into position for inspection.

"It is probably that nothing in the history of the cyclecar industry will equal this trip, driven with an experimental chassis in the midst of an unusually severe winter, over a route which is notoriously impassable for motor cars during nearly 4 months of the year," says W. A. McDermid, sales manager of the Falcon company. "This little car established clearly and conclusively the fact that there are few, if any, road conditions in this country which a properly constructed cyclecar could not easily negotiate, and further that there are many conditions under which only the cyclecar can be used effectively. The merit of the 36-inch tread was definitely proven. Only at one point was it impossible for the car to find several possible tracks in badly rutted roads. Friction transmission as applied to the cyclecar received its baptism of fire on this trip but even when the driving disk passed through snow water or deep snow—there was no dust pan under the mechanism—there only was a momentary slip, while on hills the Falcon simply ran away at will from high-powered cars.

"Another feature of the trip was the condition of the 28 by 3 Empire motorcycle tires with non-skid treads. After more than 250 miles of hard test in Cleveland and nearly 900 miles of terrific cross-country driving, the non-skid nubbins of the tread were scarcely worn, and from the time the tires were first placed on the car a pump never was used."



# Buick Company Tests Cars for "Gasoline Economy

## Six-Cylinder Shows 20.1 Miles Per Gallon Under Official Supervision

CHICAGO, Jan. 15—In a semi-official fuel test of three Buick cars, the Buick six-cylinder touring car ran 20.1 miles on one gallon of gasoline. The cars tested were a Buick model B-25, which showed a consumption of 22.5 miles per gallon, and a model B-37 which showed 17.9 miles and the six-cylinder car.

This test was conducted yesterday under the direction of F. E. Edwards, formerly chairman of the technical committee of the American Automobile Association, assisted by Darwin S. Hatch, of Motor Age, and Reed L. Parker, a local newspaper man, as observers. To the six-cylinder car and the small four, the model B-25, special fuel tanks were fitted on the dash but the model B-37 had no special tank, using the fuel from its regular pressure tank.

Weather conditions were unfavorable for a test of this kind on account of the cold, a high wind, and a snow storm. The atmospheric temperature was 45 degrees F. at the beginning of the test and 41 degrees at its conclusion. The distance was measured with a Stewart or Warner speedometer on each car. These speedometers were tested by Stewart-Warner Corp. for odometer accuracy before the run was started. The gearing at the wheels and to the speedometer instruments also was checked. On the model B-55, which was equipped with a Warner speedometer, another test of the gearing and odometer mechanism was made after the run.

The gasoline used was measured in a standard gallon measure which had been tested and sealed by the city sealer. The fuel used was commercial gasoline which showed a hydrometer reading at the beginning of the test of 62 degrees Baume at a temperature of 60 degrees F. At the conclusion of the test the gasoline again was tested and showed a hydrometer reading of 60 degrees Baume at 41 degrees F.

Two four-cylinder cars made the test with the windshield up, the six had the upper one-third of the windshield horizontal after the first two-miles. In all the cars the top was down. With the exception of 4 miles going from Thirty-third St. to Jackson park the test was made on a circular course of approximately 2.3 miles around Jackson park. The direction of the circuit was changed occasionally, sometimes the cars going clockwise around the circuit and sometimes anti-clockwise. There was a fairly high wind blowing and the last half hour of the test was finished in the snow storm. All three models were equipped with Delco self-starters and generators which were connected and in use.

Fan belts were on and the fans were operating. Before the start the motors were run until all the gasoline in the tank, line and the carbureter was used up and the pipe lines from the tanks to car-



BUICK SIX AT START



FILLING IMPROVISED TANK WITH GASOLINE

bureters were inspected to see that no other leads ran into them. Marvel carbureters were used on all three models. No adjustments of the carbureter were made on either the B-55 or the B-37 but the model B-25 carbureter had to be adjusted just after the start, this adjustment being accomplished while the motor and car were running.

Model B-55 has six-cylinders of 3¼ by 5 inches; weight with four people at the end of the test 4,550 pounds; driver Edward Lyen; observer Darwin S. Hatch. Model B-37 has four-cylinders of 3¼ by 5 inches; weight with four people at the end of the test 3,780 pounds; driver Harold Larson; observer R. L. Parker; model B-25 has four-cylinders of 3¼ by 3¼ inches; weight with four people at the end of the test 3,300 pounds; driver Al Meiser; observer, F. E. Edwards.

### JEFFERY AGENTS FORECAST OUTLOOK

Kenosha, Wis., Jan. 9—A careful canvass of more than 600 responsible dealers identified with the Jeffery organization throughout the United States soliciting their opinion of the present business situation has just been completed by E. S. Jordan, sales manager of the Jeffery Company.

The result is interesting to all students of economics, bankers, business men and

quite likely to the administration at Washington. The conclusions reached are as follows:

The revision of the tariff has had very little to do with the increased conservatism of bankers, manufacturers and property owners.

The farmer, upon whom the prosperity of the country largely depends, has not been affected except by rumor. He has lots of money and will buy in the spring, but not extravagantly.

The sentiment west of Philadelphia among dealers and buyers has changed but slightly within the year. In the east the opinion of Wall street has more weight and people are not buying so many expensive cars.

Except for the conservatism of bankers in extending credit to dealers, the motor car business, as far as the substantial companies are concerned, will be just as big as last year.

Since 1910 people have been overbuying a little, with the result that they feel the necessity of saving more.

The first effect upon the motor car industry is shown in the decreased sale of heavy cars and the increased sales of medium-priced light cars that are economical.

The passage of the currency bill has relieved a great deal of tension as far as loans from small town banks is concerned, as they were holding up, apparently waiting for the big city banks to pass the word along.

New companies and new capital are being put into the motor car business in cities all through the country, but the demand is for medium-priced light cars of quality.

There is every indication that the period of retrenchment, while it may extend through the month of January, will be relieved by better business in February, with the general opening up in all lines with the opening of spring.

The motor car industry, as a whole, will be benefited, rather than injured, by the conservatism of the past two months, as it will eliminate from the field undesirable elements which have always been detrimental to the progress of the conservative and more business-like companies.

### COLUMBUS BUGGY TO REORGANIZE

Columbus, O., Jan. 17—Another step has been taken in the proposed reorganization of the Columbus Buggy Co. which has been operated by a committee of creditors since June of last year. At a meeting of the creditors held January 15, the proposition of Frank L. Chase and others to buy the property for 10 cents on the dollar in cash and 40 cents on the dollar in bonds of the proposed company was rejected.

It was decided that the reorganization should be made by the creditors themselves and a committee consisting of O. A. Miller, J. W. Kavanaugh and Frank L. Stein was named to work with the present creditor's committee in preparing for reorganization.



# Speed and Reliability Features of Magneto Development

## Faster Breaker-Box Mechanisms, Better Waterproofing and Hotter Spark at Low Speeds Refinements of Season

ONE of the features in which distinct advance is noticeable from year to year is that of ignition. Greater reliability of ignition has gone hand in hand with other improvements in the cars and much of this may be credited to the magnetos. It is not surprising that further improvements in the magneto field involve nothing radical.

Still, the past year has seen some improvements along three well defined lines, these being faster breaker-box mechanism, better waterproofing and a more intense spark at low speeds and at all degrees of advance.

The magneto itself can be classified under two general heads, high-tension and low-tension. The high-tension machine has a primary and secondary winding on the armature, or in other words carries a self-contained high-tension coil. The low-tension machine merely uses a primary winding on the armature which generally consists of about 150 turns of wire having a sectional diameter of about .05 inch. The high-tension machine has the primary winding within the secondary winding. With the low-tension instrument, it is necessary to have an exterior coil to secure the high-tension spark at the plugs.

### Principles of Operation

A magneto consists of two fundamental parts, the magnets and the armature. The magnets are made of hard steel because this material retains its magnetism longest. The armature consists of a soft iron core which carries the winding which may either, as explained above, be a low-tension one alone, or a combined high-tension and low-tension. The low-tension winding consists of a number of turns of copper wire, each layer of which is separated from the next by some insulating material. This winding, cutting the

lines of magnetic force which flow between the magnet arms or poles, becomes charged with a current which is either high-tension or low-tension according to the winding. The voltage generated depends on the number of lines of magnetic force which are cut by the armature and therefore at one position of the armature, the maximum number of lines are cut, and at that point the most intense spark can be created. It therefore is the object of magneto makers to have the spark occur as often as possible and under as many conditions as possible when the armature is in the position in which it cuts the greatest number of magnetic lines of force. This effort on the part of magneto makers gives rise to most of the changes of design from year to year.

Passing over the details of construction of the magneto, the current generated in the low-tension instrument is taken through an exterior coil and through the action of a circuit breaker the high-tension current is generated and by means of a distributor carried to the proper spark plug. In the high-tension instrument this mechanism is self-contained and by means of the breaker box which is generally located on the end of the armature shaft, the low-tension current is broken and a high voltage created in the secondary winding. The sharpness with which the low-tension current is broken is one of the features which determines the strength of the high-tension current, and therefore magneto makers are endeavoring to improve the breaker box mechanism in order to get the quickest possible break.

### Waterproofing a Feature

Water breaks down insulation. A leaky insulation cuts down the number of effective turns of wire in the winding and therefore it is not surprising to note that the magneto makers are doing their utmost to make their product as nearly waterproof as possible, and herein lies the third line of improvement this year. With the points outlined above, the reader may study in an intelligent manner what each of the makers are doing to produce a better magneto as far as efficiency is concerned in both an electrical and mechanical sense. One other feature should have attention: This is making the magneto to suit the particular class of vehicle for which it is intended as regards weight and size.

The magneto is used in three principle ways, that is, in single, dual and double systems. In the single system which is rapidly coming to the front, the magneto alone supplies ignition current.

Where there is only one source of current

for ignition, a dry battery, a storage battery, or a magneto alone, the system is called single system.

In order to make sure of ignition current, and particularly to make cranking easy, most cars are supplied with both magneto and battery—usually a storage battery. A switch on the dash permits either source of current to be used, both going through the same distributor, usually, and both firing the same plugs.

Ignition systems in which there are two sources of current with one set of plugs are called dual ignition systems.

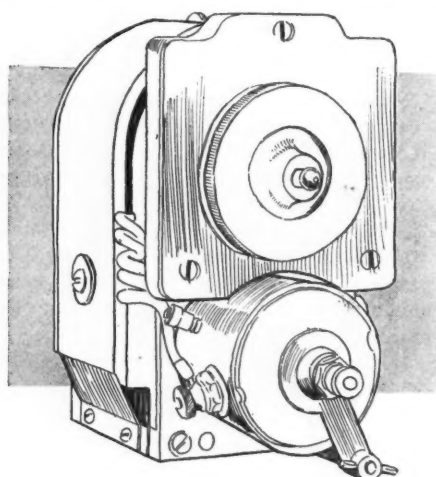
If the plugs should go wrong with the dual system, the ignition would be in a bad shape as if there was only one source of current. So to make sure that there will be no trouble on this score, some makers employ not only two sources of current, but two sets of plugs as well, letting the battery fire in one set of plugs or the magneto fire in the other.

Ignition systems in which there are two sets of plugs and two sources of current are called double ignition systems.

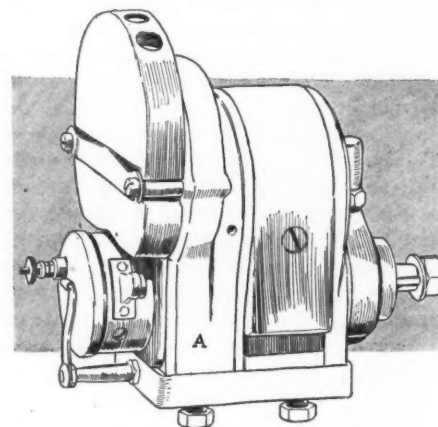
### Double-Distributor Systems

To make assurance doubly sure, a few cars are equipped with systems in which there are not only two sources of current and two sets of plugs, but two distributors as well. These are called double-distributor systems. This makes two complete systems, the only part common to the two being the switch, and often two separate switches are used.

Sometimes this switch is so arranged that either the battery or the magneto system may be used separately or together, one firing on one set of plugs and the other on the other set of plugs. This gives two sparks in each cylinder at the same time and at two different places in the cylinder. This makes it as certain as is humanly possible that there will be a spark in the cylinder, and the two sparks in the cylinder increase the power of the



Michigan magneto in latest form



Herz with automatic advance



engine, because the gas is ignited at two different places and gets burned more quickly. Such systems are called two-spark independent systems, and the firing is called multi-point ignition when both sets are worked together.

Ignition systems in which there are two sources of current, two sets of plugs and two distributors are called double-distributor systems, and when arranged to operate independently or together are called two-spark independent systems.

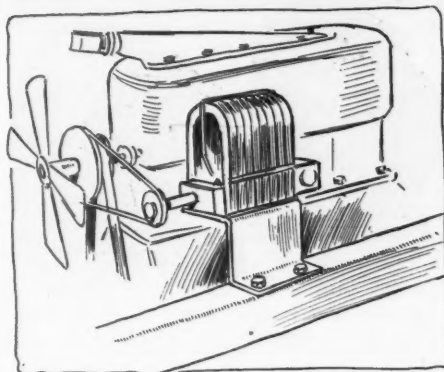
In some double-distributor systems the arrangement is such that either source of current can spark on either set of plugs alone or on both sets of plugs at the same time, but only one source of current can be used at any one time. Such systems are called dual-double systems.

Double-distributor ignition systems in which either current source can operate either set of plugs or both sets of plugs together, but only one source of current is available at a time, are called dual-double systems.

#### Operation of Dual System

The battery circuit of a dual system consists of a battery, a commutator or timer, and a coil. The circuit makes use also of the magneto distributor board. The commutator has as many segments as there are cylinders. The commutator usually is on a shaft. Running through the shaft is another shaft. As the camshaft revolves it turns the commutator shaft, which in turn revolves the arm. As the arm turns around it makes contact with the segments on the side of the timer.

**Bosch Line Little Changed**—The Bosch Magneto Co., Springfield, Mass., is making a line of high-tension magnetos which is noted for its completeness. These are known as ZR, ZU, ZE, and DU. The two leaders of the line are the ZR-4 and ZR-6, the figures 4 and 6 indicating the number of cylinders for which it is designed. The ZR-4 is illustrated and has been designed as an improvement over previous models in the way of greater accessibility and high electrical efficiency at low rotative speeds.



Holtzer-Cabot direct-current magneto

This magneto is designed for a four-cylinder engine and should be driven at crankshaft speed for a four-cycle design.

The ZR magneto, which can be used as a single system or in connection with a battery such as in the dual or double arrangement, is entirely enclosed or rendered waterproof by means of special packing which is inserted between the magnets and also between the ends of the magnets and the frame of the magneto. The cable connections also are waterproof and the oil holes are protected by spring covers which preclude the possibility of any moisture working its way into the magneto. This caution in sealing the magneto not only renders it waterproof, but also prevents the noise due to driving it from being heard.

In order to produce a maximum spark at any rotative speed or at any timing advance, the pole pieces of this magnet are toothed, or slotted at their ends to give the appearance of a comb. Another feature of note concerning this type is an accessible arrangement by which the timing of the magneto in relation to the motor may be controlled without removing any of the parts. Above the upper gear which drives the distributing mechanism is a small glass peep hole through which the gear teeth may be seen. One of the teeth is marked and the edges of the rim holding the glass are also marked. These two marks

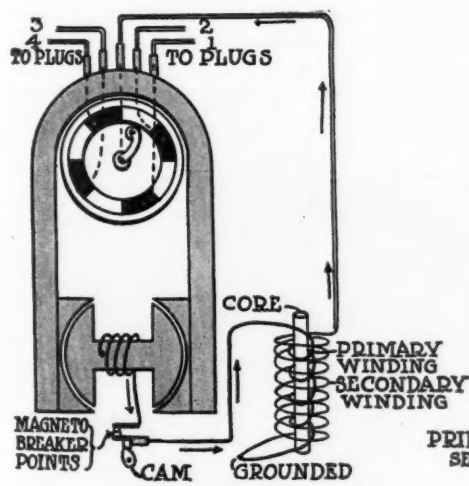
should register when the crankshaft is turned so that cylinder No. 1 is in firing position at full advance and the magneto armature is in such a position that the figure 1 appears in the distributor window located in the front of the instrument near the top. The ZR-4 magneto is shown with the distributor window between the numbers 1 and 2 on the distributor cover plate. The other window for seeing the gear teeth becomes visible when the oil hole cover plate, shown on the top of the magneto, is raised.

The Bosch breaker mechanism remains unchanged. This is a particularly rapid breaking mechanism, the action being obtained through a cam tripping an interrupter lever carried on a spring.

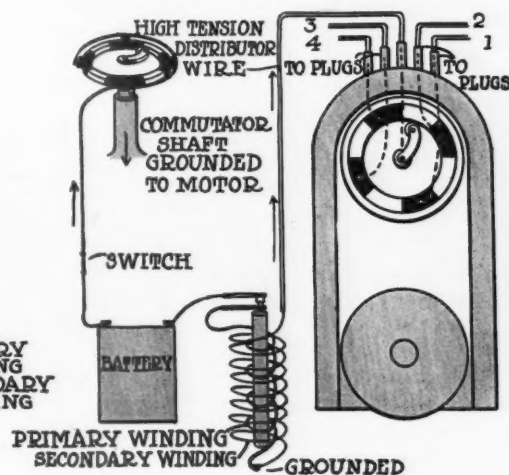
**Briggs Drops One Model**—The Briggs Magneto Co., Elkhart, Ind., has dropped one of the two models of magneto that were carried last year and this year is pinning its faith to one type which is known as the model C. The model dropped was the model A.

In general the Briggs magneto is of the low-tension type having one primary winding on the armature core. The transformer coil is carried separately on the dash. The two horseshoe magnets are of tungsten magnet steel and the entire instrument is made in such standardized size that it may be substituted for any other make. The breaker box mechanism has not been changed and the same material is used throughout. The breaker points are of platinum-iridium which the maker states give long life when protected by the special type of condenser used on these instruments.

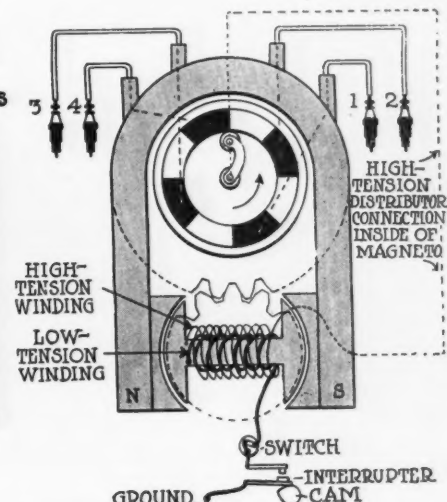
A feature of the Briggs magneto is the lubricating scheme which provides, by means of a 6-ounce tank, sufficient lubricant to take care of the wants of the magneto for 15,000 miles. In other words the magneto need be oiled but once a year. The oil feeds automatically from this tank which is located at the top of the instrument, to all the bearing surfaces throughout the machine. Another feature



Skeleton of low-tension magneto with external coil

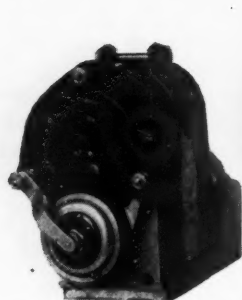


Skeleton of high-tension magneto dual system with battery



Phantom view of a high-tension magneto showing both windings





Splitdorf EU4 waterproof design



Simms waterproof instrument



Remy model P low-tension type



Kingston, with new breaker box

which the maker has taken care of is easy adjustment. The entire breaker mechanism can be detached from the magneto by removing a single nut.

If desired, an automatic feature will be provided with these magnetos. This is a centrifugal action by means of which the amount of advance is increased according to the rotative speed of the armature shaft of the magneto. The device is so designed that the spark occurs at the proper point at all rotative speeds.

**Connecticut Makes Two Types**—For 1914 the Connecticut Telephone and Electric Co., Meriden, Conn., continues to market the same line of magnetos as for 1913. No changes whatever have been made.

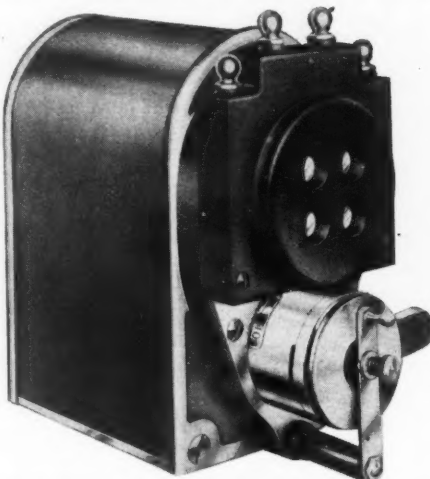
The Connecticut magnetos are made in two types, independent and dual. They are adaptable to four and six-cylinder engines. The Connecticut magneto while a self-contained high-tension instrument, does not carry two windings on the armature. Instead, the transformer coil is mounted above the armature shaft between the magnets, giving a complete high-tension instrument without the double-wound armature. The transformer coil is of cylindrical shape and is incased in a metal tube which is threaded at the outer end so that it can be screwed directly into the magneto.

**Dean Has Improved Type**—The Dean Electric Co., Elyria, O., is making a type of ignition apparatus which differs materially from any other on the market. It is distinguished by the fact that all the wiring carries comparatively low voltage and that the voltage is stepped up in a resonator which is mounted adjacent to the spark plug. This magneto is furnished for a single system in which a single-contact, short-circuiting switch is the only dash instrument having anything to do with the ignition. It is also manufactured in a dual system in which a cylindrical step-up coil is mounted on the dash in conjunction with the ignition switch.

The high-frequency single system consists of a low-tension magneto with a breaker box and a low-tension distributor. The individual primary wires lead from the distributor to the resonators. The only other wire used is that leading to the short circuiting switch on the dash. The reason the resonators are placed close to the spark plugs is to avoid losses of energy through voltage drops in long wires.

The dual system employs the same elements as the single system with the addition of a combined dash coil, condenser and switch. The magneto is used for regular ignition and current from a 6-volt battery is kept as a reserve. The dash coil is of a plain winding of coarse wire over a core of soft iron wire. The switch is used for connecting either the armature or the battery circuit through the breaker box and condenser. A push button is also provided for starting the engine on spark.

The resonators are simple transformers of what is known as the Tesla type, having no magnetic cores. A secondary winding



Connecticut with transformer coil in magnetos of 1,200 turns of number 36 wire is first applied to the spool then a primary of  $7\frac{1}{2}$  turns of number 19 wire. Each winding is separated from the next by paper and the entire unit is protected by compositions rendering it electrically non-conductive and proof against moisture, oil and heat.

**Two New Eisemanns**—Two new models for 1914 have been brought out by the Eisemann Magneto Co., Brooklyn, N. Y. These new models are known as EMA and EMAR and are different from the model EM of last year only in that they incorporate an automatic advance feature. The Eisemann line is now made up as follows:

Types EM, EMA, EUA and EDA for one, two, three, four, six and eight-cylinder motors are single ignition instruments. Types EMR, EMAR, EUAR and EDAR for three, four, six and eight-cylinder motors and type EB are for four-cylinder motors only.

The EB is the only magneto made by

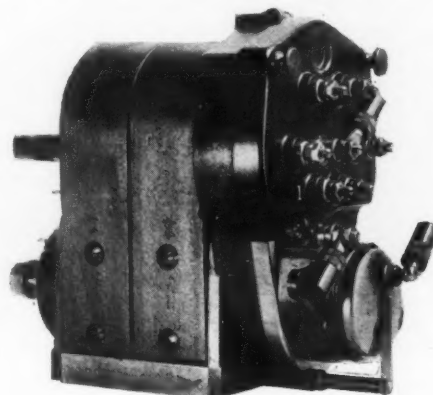
the Eisemann company which does not carry both a primary and a secondary winding on the armature. In this model there is only a low-tension winding on the armature and the step-up coil is carried separately. As a general rule it is mounted on the dash.

No changes have been made in the mechanical features of the Eisemann magneto with the single exception of the addition of the automatic advance feature to the two models mentioned. The breaker box mechanism remains the same as formerly and the composition of the platinum points has not been altered. In the way of waterproofing there is a waterproof distributor plate which can be used on all models.

It is generally in the arrangement of the pole pieces that the high-tension magnetos differ materially from one another and in this respect Eisemann construction is unique. These pole pieces differ from ordinary design in that they are tapered to lie approximately in the plane of the theoretical axis of the core of the armature. This is said to prevent the diffusion of the lines of magnetic force and hence to increase the intensity of the induced spark on account of the cutting of more magnetic lines of force by the armature. The shape of the armature and its size is such that at no time is it entirely separate from the magnets. This is so arranged with the idea of having the armature act as a keeper for the magnets and therefore to prolong their life.

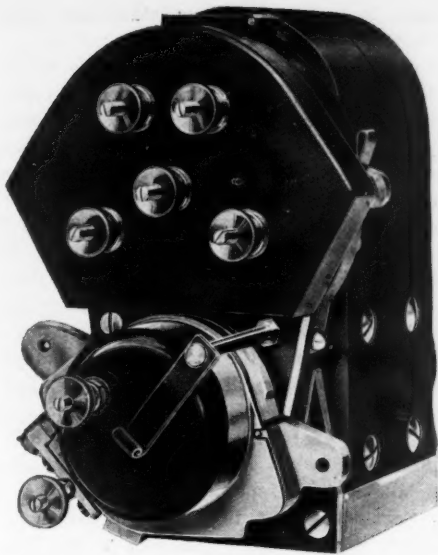
**Heinze Continues Low-tension**—The Heinze Magneto Co., Lowell, Mass., is continuing the manufacture of the low-tension magnetos which are distinguished by the fact that the magnets are circular in section. The change made last year of grounding both ends of the primary winding is continued. The instrument is made up for four or six-cylinder engines and its breaker mechanism etc., has not been changed.

The secondary winding of the Heinze magneto is not carried as a unit with the instrument but is mounted on the dash. According to the Heinze company the object of using the round instead of flat-sectioned magnets is because a better contact can be secured with the pole pieces. The contact is secured by grinding the ends of the magnets and reaming the holes in the



New Eisemann instrument





Bosch new ZR4 magneto

pole pieces so that a secure fit is given. The material used in the magnets is tungsten steel. The breaker box cover is made of steel tubing with fiber insulation which is shrunk on the outside of the steel.

**Herz Adds New Types**—The line of Herz & Co., New York, has undergone considerable refinement for the 1914 season. This company has taken cognizance of the cyclecar wave and has brought out a special magneto which is adapted for this type of car. Another magneto which has been added to the line is specially adapted to taking care of the two-cylinder cyclecars. The small four-cylinder type, which is known as 4-U-4 is of special interest due to its small, compact design. Although a highly efficient machine, its weight is but 9.5 pounds. The distributor disk on this type of magneto differs from previous designs in that the secondary terminals are attached to the sides instead of to the top.

All magnetos made by the Herz company are of the high-tension type having two windings on the armature, but in the latter types, which are sold this year for the first time, there has been some change in the breaker box mechanism and also in making the instruments more thoroughly waterproof. The change in the breaker box mechanism does not involve any alterations in the operation of the device but the platinum points have been made larger with an eye to increasing their durability. Along the same line of durability the segment box is made of heavier material and the shoulder of the bearing box upon it which carries the segment of distributor box has been lengthened to give the latter a more firm support.

The timing advance lever is stronger and of heavier material and is now fastened to the distributor housing with two screws instead of one. A more rigid connection of the steel segments to the segment box is another feature of this year's magneto.

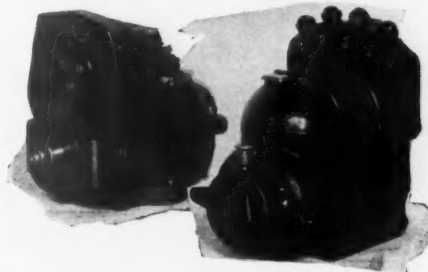
Along the lines of automatic advance the Herz company has been working con-

sistently. The company is now prepared to furnish any of the motor car magnetos with this type of advance, so arranged as to follow any degree of advance at any speed within reasonable limits. The automatic advance device consists of two disks which are brought face to face with six grooves having a spiral twist. Each of these grooves contains a ball so that there are six balls between the two disks. When the disks revolve, the balls tend to move around in the spiral grooves and create a twist which provides the advance.

#### Holtzer-Cabot Gives Direct Current—

The Holtzer Cabot Electric Co., Brookline, Mass., is producing a machine which it calls a magneto-generator because this not only fulfills the purpose of a magneto in furnishing ignition current but also provides the source of current for an electric lighting system. This instrument can be mounted on any car and driven by belt. The principle of the device and its mode of operation have been described under the head of Lighting Generators in Motor Age for January 15.

**K. W. Adds Impulse Starting Mechanism**—A complete line of both high-tension and low-tension magnetos is made by the



Two types of Mea, one with and one without rocking magnetos

K. W. Ignition Co., Cleveland, Ohio. For the 1914 season no great changes have been made in the line of magnetos suitable for motor car use except that the high-tension model H instrument will now be furnished with an impulse starting device.

The impulse starting device is a spring-operated mechanism which when released spins the armature and gives a spark which should start the motor. The device operates on a spring and ratchet principle. A dog

picks up the ratchet and when the motor is turned the magneto does not revolve until a sudden cam release causes it to spring around, giving a hot spark and thus firing the engine regardless of how slowly the crank is turned.

A noteworthy feature of K. W. magnetos is that the windings are entirely separate from the armature and are stationary. The winding is concentric with the armature shaft and is mounted between two halves of a rotor. The rotors collect the magnetism from one pole piece and conduct it through the center of the winding to the opposite pole piece. The winding on the high-tension type includes both the primary and the secondary, the primary part of the winding has its current interrupted by a circuit breaker in the customary manner.

On the low-tension K. W. magnetos the winding is a stationary spiral of copper ribbon. This winding is concentric with the rotor as in the high-tension machine. In this type of magneto the induction or secondary coil is carried on the dash of the car.

**New Breaker Box on Kingston**—For 1914 the Kokomo Electric Co., Kokomo, Ind., is marketing a total of twenty-two different magnetos. The main difference in these, however, is in the size. Many of the model names of the Kingston magnetos have been changed due to the fact that an entirely new breaker box mechanism has been added for 1914 and all the magnetos using this have a different name.

In general, the Kingston magnetos are of the low-tension type, having but a single winding on the armature. Three types of step-up coil are sold for use with these magnetos. They are the dashboard type with switch, the tube coil with switch and the box coil with switch separate.

The breaker box is entirely new this year. Contact between two platinum points is broken by means of a flat cam so arranged that a depression in its surface bears on a fiber-tipped follower twice for every revolution of the armature shaft. The follower is mounted on the same piece of

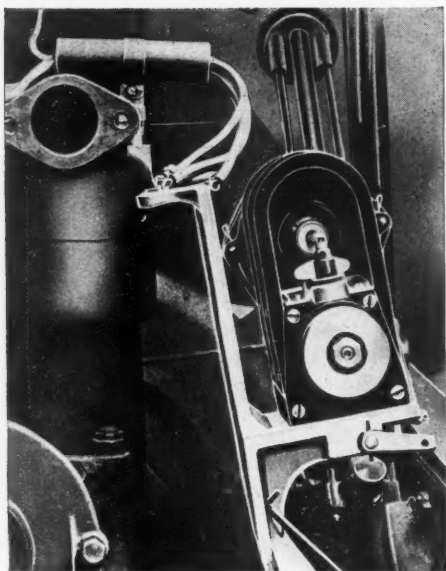


National's new type with timing indicator

Heinze, with circular section magnetos

K. W.'s new product, with kick-off mechanism





*Bosch application to Fords*

spring steel as the movable platinum point and when this is depressed the points are separated. The breaking action takes place in a line parallel to the axis of the armature shaft, that is inwards and outwards.

**Mea Alters Appearance**—Marburg Bros., Inc., New York, are importing a machine which differs entirely in external appearance from the Mea magnetos of previous years, although the old Mea principle of bell-shaped magnet which together with the breaker mechanism is shifted around the armature has not been changed. This principle, is utilized in order to have the spark occur when the greatest number of magnetic lines of force are being broken by the armature winding, regardless of the time at which the spark occurs in relation to the stroke of the engine.

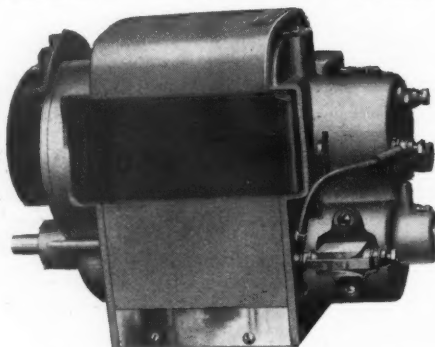
The Mea magneto is a high-tension instrument. This year it is seen in highly waterproof form, this being the reason that the exterior appearance has been changed. Another improvement for this season is in the breaker mechanism. Whereas the points used to separate in a horizontal direction they now break in a perpendicular line. That is, the break occurs at right angles to the line of the axis of the magneto instead of parallel to it. The number of brushes necessary has been cut from three to two in the distributor finger. The scheme now used consists simply in having one brush take the current from the armature to the axial point of the distributor finger and the other brush is at the radial point of the distributor finger and through wiping contact applies the current to each of the four points on the distributor plate which lead to the spark plugs.

Although the timing range of the magneto is not so great this year as in the past; 45 degrees as compared to 70 degrees, the latter amount was found to be more than 75 per cent of the people using magnetos would employ. The sacrifice of the excess range in timing which was for

the most part found to be useless has more than been made up by the gain in waterproofing and efficiency.

**Remy Drops Inductor Design**—Four models of magnetos are made by the Remy Electric Co., Anderson, Ind., for 1914. They are known as P-30, 31, and 32. They are made for two, four and six-cylinder engines with single and double distributors. All these magnetos differ from their predecessors in that they use the low-tension armature in place of the inductor type. For this reason all Remy magnetos are now found with a single winding on the armature generating a low-tension current.

At the same time that the Remy company has changed from the inductor to the low-tension type of magneto, it has provided coils for use with these machines and they are adaptable either for the dash or they may be fitted to the engine base. The dash coil is fitted with an integral switch, the face of which only appears through the dash. The engine base coil is a separate unit within itself. It is mounted on the crankcase or in any convenient place in close proximity to the magneto. It is supplied with a separate



*Briggs has oil tank for 15,000 miles*

switch which provides the usual three positions, namely: battery, off and magneto.

A new breaker box design is used in this year's Remy with an idea towards getting a faster break and at the same time of having it readily accessible. The entire circuit breaker box can be removed without the aid of tools. The action of the breaker box is by means of a simple cam of chrome-nickel steel. The points are a platinum-iridium combination.

The distributor is an improvement over earlier models in that it has been rendered more waterproof and it is now provided with packing to prevent leakage. The distributor also differs from previous Remy magnetos in that it is provided with a wipe contact in place of the open gap previously used. No automatic advance features are used.

**Simms Magneto Unchanged**—The Simms Magneto Co., East Orange, N. J., is continuing its line of independent and dual magnetos without change. These magnetos are high-tension types and have the common feature of possessing two magnets. A fixed spark is provided if desired on the single type of magneto and in this

case it is fitted with a stationary cam ring.

The feature of the Simms magneto which renders it distinctive from any other high-tension type is the fact that the pole pieces are notched back from the center for the purpose of concentrating the lines of magnetic force at the extreme pole ends and thus producing an intensified spark. Great care is given to waterproofing these machines.

**Splitdorf New Waterproof Design**—The Splitdorf Electrical Co., Newark, N. J., has put out for 1914 a brand new magneto. It is of the high-tension type and is known as the EU-4. A special feature of this magneto is its waterproof and dust-proof design. It is adapted to motors up to about 30 horsepower.

Construction of this new magneto embodies an aluminum base to which the pole pieces are secured and between which revolves an armature carrying both the high-tension and low-tension windings. Mounted over the armature a condenser is clamped between two metal plates which are fastened to the pole pieces. The magnets are tungsten steel and straddle the pole pieces. The whole machine is housed by an aluminum cover fitting tightly over the end plates providing protection against dust and moisture.

The circuit breaker is attached to the armature shaft and revolves with it. The design of the mechanism is such that the platinum points come in contact with one another in a positive manner at a high speed due to centrifugal action. This permits the use of a weaker spring and lessens the wear on the cams. One end of the breaker arm supports a fiber roller which is adjustable for wear. This roller comes in contact with a steel cam causing the primary circuit to break. The cam holder can be shifted to the extent of 23 degrees advance.

For attachment to Ford cars the Splitdorf company has an ingenious scheme by means of which the owner can apply his own Splitdorf magneto. A feature of the new magneto is in the breaker box cover



*Dean-Elyria Hi-Fre-Co has resonator on spark plug*



which now contains the condenser on some models. On these the brush design is different owing to the fact that the condenser takes up some of the space. The Splitdorf company claims that there is less current lag when the condenser is placed in the position just described.

**Ericsson Cyclecar Magneto**—Under the name of type N the Ericsson Mfg. Co. has brought out a new high-tension magneto which contains both windings on the armature. It is a waterproof design and the armature is so enclosed that it is claimed the magneto can operate without fear of moisture. The setting of the timing has been improved in this magneto and the design has been so arranged as to render it impossible for missing to occur through

the sticking of the interrupter arm. The frame is in a solid unit and the interrupter cams are solid with the housing. This is a distinct cyclecar magneto although it can be used on other small cars.

**Timing Dial on National**—The National Coil Co., Lansing, Mich., is featuring a magneto with a timing dial on the driving end. An arrow on the distributor shaft shows the position of the traveling contact. A feature of the National magnetos is the low-tension distributor with a separate coil for each cylinder. These coils are mounted near the spark plugs so that the high-tension wiring is as short as possible. The National coils are about one-fourth as large as the conventional type of dash coil.

## Provides Automatic Meshing of Gears Eclipse-Bendix Transmission for Cranking Motors Has Many Novel Features

**S**ATISFACTORY connection of the electric starting motor to the gasoline engine to meet the peculiar conditions of the case has been one of the real problems in the field since the electric motor was first thought of as a means of cranking. Among the conditions that make the problem difficult are that the motor must not remain in geared connection with the engine after the latter has commenced firing. If it does, the speed will be such as to cause damage to the motor electrically, due to excessive generation of current or mechanically, by ruining the bearings. Furthermore, to be a practical device this disconnection immediately after starting must be independent of the operator. Otherwise the accidental depression or retention of the starting pedal after starting had been actually accomplished, would put the machine out of use.

One method has been to include an over-running clutch in one of the gears so that the electric motor can apply power only until the engine commences turning at a higher speed than that represented by the gearing. This method is sure but it means that one member of the over-running clutch must remain in motion all the time the engine is running.

The other method of applying the starting motor is that of sliding a pinion into mesh with teeth on the periphery of the flywheel. By this arrangement there can be an absolute disconnection of the engine and starter when the engine is running. Figures show that this year the flywheel-pinion application has been adopted in more than double the number of cars than any other method. The necessary components of this type of starting mechanism are: a means of sliding the pinion interconnected with the starting switch so that both operations can be performed simultaneously, and a one-way clutch to protect the motor after starting.

There recently has been brought out a new method of applying the electric starter, shown in the accompanying illustration, known as the Eclipse-Bendix automatic transmission which needs no arrangement of levers to slide the pinion into mesh nor any over-running clutch. It is only necessary to operate the switch of the motor, and this can be done at the wrong time, i. e. when the engine is already running, without damage.

### Pinion Meshed Automatically

The parts are few and simple. The armature shaft has a screwed extension provided with an outer bearing B and carries the pinion P. A weight W is solidly attached to the pinion and the latter is loose enough on the shaft to always occupy the position shown, with the weight underneath when the shaft is idle. The leading screw is a triple thread. On starting the motor inertia of the weight W causes it and the pinion to be carried quickly along

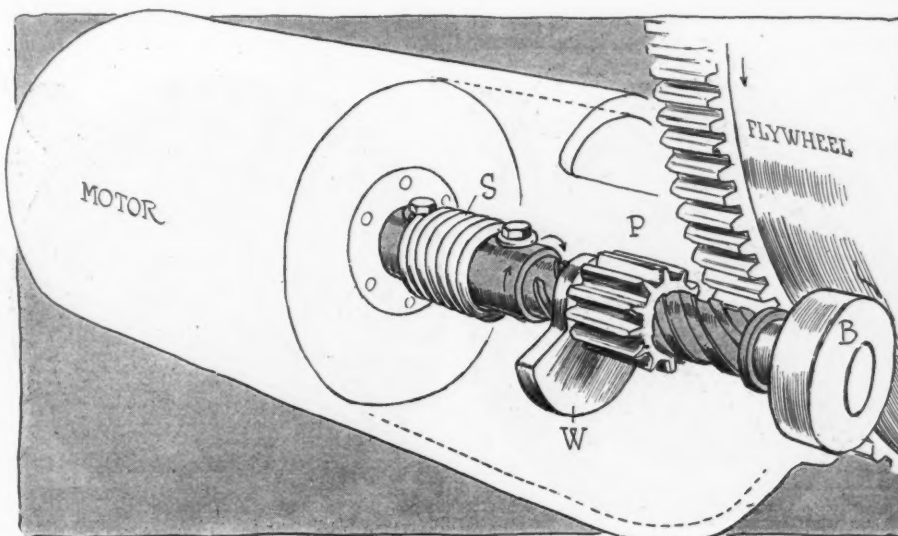
the shaft into mesh with the teeth on the flywheel where it remains performing the operation of cranking until the engine commences to fire, when the direction of the drive is reversed, coming from the flywheel to the pinion, throwing out the pinion.

So far the action is easy to understand. But a query will naturally arise as to what would happen if the starting switch is not released and the motor continues spinning. It would seem that the pinion would again return and either get into mesh or continue chattering at the edges of the teeth. Neither happens. The pinion simply continues to rotate out of mesh until the switch is released. This is due to a secondary function of the weight W. Immediately the pinion is thrown out from the flywheel the speed of the motor is such as to cause a binding of the pinion on its shaft due to the one-sided position of the weight. The action involved is that of the center of gravity of the weight attempting to get into the central plane of rotation of the pinion and the slight necessary looseness of the pinion on the shaft allows a temporary binding as a result.

The spring S is simply to ease the shock of starting by permitting a slight play between the motor shaft and the screwed extension. The teeth of both flywheel and pinion are beveled on the entering side for easy engagement. As shown the motor is geared by a single reduction to the engine, but the device is equally applicable to a double reduction. The Eclipse Machine Co. is the maker and Brandenburg Co., Chicago, the agent.

### AFTER ENGINE PLANT IN RACINE

Racine, Wis., Jan. 20—It is reported that a large eastern motor manufacturing interest is negotiating with the trustee of the bankrupt Wisconsin Engine Co., of Corliss, Racine county, Wis., for the lease or purchase of the big engine works which it proposes to use for the production of a line of gasoline motors for pleasure, commercial and cyclecars and tractors.



ECLIPSE-BENDIX AUTOMATIC TRANSMISSION FOR ELECTRIC CRANKING MOTORS



## New Atwater Kent Unisparker

### Sturdy Construction a Feature

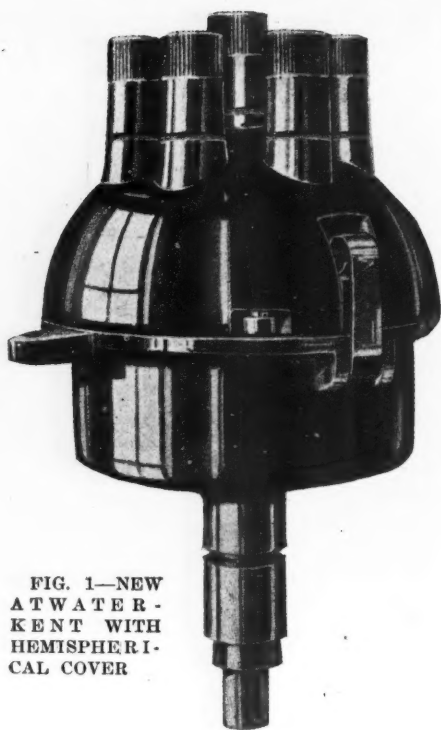


FIG. 1—NEW ATWATER-KENT WITH HEMISPHERICAL COVER

**I**NCREASED sturdiness of construction mark the latest model of the Atwater Kent Unisparker, Fig. 1. The chief apparent differences are a more massive cover of hemispherical shape which has a quieting effect on the slight clicking sound produced by the action of the small trigger inside, and a longer and larger shaft extension for attachment to the half-time shaft of the engine. The centrifugal mechanism contained in the lower part of the casing by which the spark is automatically advanced with the speed of the engine has not undergone any alteration over last year.

The action of this ingenious form of governor is obtained from four weights distributed symmetrically about the two shafts of the device. The lower one of these shafts, which projects from the casing, carries the drive to a smaller upper shaft on the same axis. The connection is not positive but consists of two S-shaped cross pieces Fig. 2, at the left, one of

which is permanently attached to each shaft, and which are held opposite each other by light springs.

When turning slowly the lower shaft rotates the upper one without varying the relation between the two cross pieces. But on speeding up the centrifugal action of the four weights which are pivoted bell-crank fashion to the crosspieces causes the latter to separate radially, the upper one obtaining a slight lead over the lower. The upper shaft being directly responsible for the production of the sparks, the ignition is automatically advanced.

Referring to Fig. 2, at the right, the action of the contact breaker will be seen. The upper shaft in the center has a number of notches, four or six, according to the number of cylinders, cut near the top. Bearing against the shaft at this point is a light hardened steel trigger held there by a small spring. On turning the shaft this trigger is carried forward by the notches in the shaft and suddenly released as the hooked end leaves the notch. In so doing the back of the trigger strikes a small pivoted hammer situated immediately behind, between the trigger and the contact points. This transmits the sudden action to the contact points which close and open with remarkable rapidity, producing the spark.

#### Simple Contact Adjustment

For adjustment of the platinum contact points the simple means of inserting a number of extremely thin washers under the head of the contact screw is used. On the contact surfaces showing signs of wear it is only necessary to remove one of these washers and replace the screw. To obtain silent action the contact maker base is supported loosely on three screws. The distributor consists of a hard rubber block carrying a brass quadrant that is fitted to the top of the shaft and in rotating passes the high-tension current to the spark plugs by way of four or six

terminal points embedded in the hemispherical cover. There is no actual contact between the rotating quadrant and the distributor points, as the current jumps the slight gaps, and therefore, no wear. The center terminal is a combination of carbon and brass and a light flat spring on the quadrant bears against it.

The cover is easily removable without the use of any tools, being held by two spring clips. Location pins in its lower edge prevent its being replaced in any other than the correct position. This construction also applies to the quadrant arm of the distributor, the driving slot in the upper end of the shaft being slightly offset, and to the contact maker base of which the three supporting points are not equidistant.

#### Special Ford Model

A smaller model of the unisparker specially suited for application to Ford cars is also on the market. This is similar in design and is mounted on a three-armed bracket for bolting on the engine in the place of the timer. The bracket has an extension that brings the distributor up to an accessible position near the top of the cylinders. When fitting, a single-non-vibrating coil is substituted for the four vibrating coils. This coil is contained in a box for mounting on the dash.

The installation of the entire ignition apparatus can be made by any garageman or any owner who understands the timing of his motor, in about 4 hours. No machine work is necessary and the only tools required are a wrench and a screw driver. The radiator should be temporarily removed to facilitate matters, and also the fan and pulley assembly and the rod connecting the spark control. The timer with its wires is then removed and discarded, the hexagon is then removed and discarded, however, being retained to hold the loose gear of the new system.

#### NEW CANADIAN CAR COMPANY

St. John, N. B., Jan. 17—The Dominion Motor Car Co. is a newly organized concern with a capital of \$400,000, largely subscribed in the United States, and having connected with it such prominent men as P. A. Rockefeller, J. M. Kilburn, president of the National City Bank; J. H. Flagler and George F. Vincent. This company has purchased the Maritime Motor Co. and 2 acres of land at Coldbrook. A contract for the erection of a building to cost \$65,000 has been placed with the T. A. Gillespie Co., of New York, and the work will commence within 60 days. Ninety thousand dollars' worth of machinery has been ordered from a well-known New York firm. It is expected that the plant will be in running order shortly.

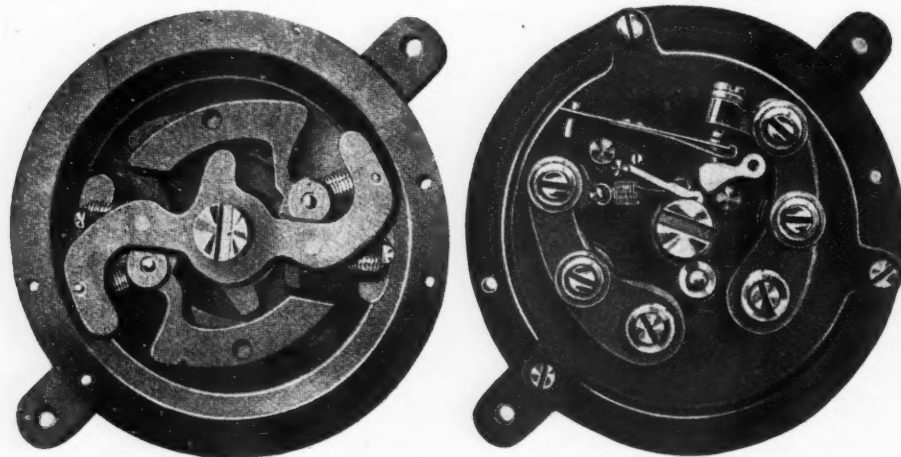


FIG. 2—AT LEFT IS SHOWN THE CENTRIFUGAL GOVERNOR USED FOR AUTOMATICALLY ADVANCING THE SPARK. CONTACT BREAKER MECHANISM AT THE RIGHT



# Worm Drive and Transmission Brakes for Chicago Taxis

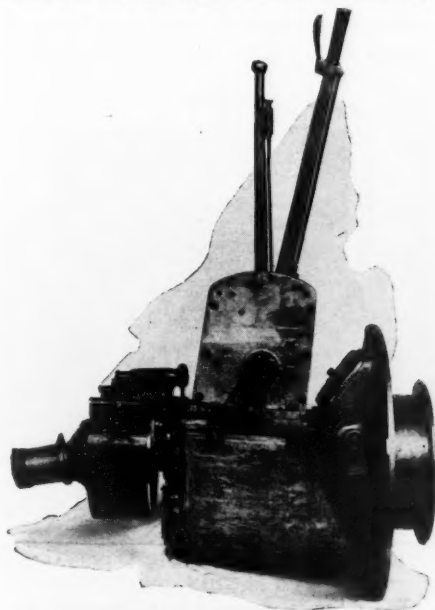
Walden W. Shaw Livery Co. Finds European Ideas Meet Exacting Conditions of Taxicab Service

**C**ONDITIONS of taxicab service require a highly specialized vehicle for economical operation. The Walden W. Shaw Livery Company, Chicago, has found it impossible to obtain a chassis on the market which meets the requirements of public motor cab service and for the past 3 years has built its own cars. It is interesting to note that no change of any nature has been made on this chassis until now.

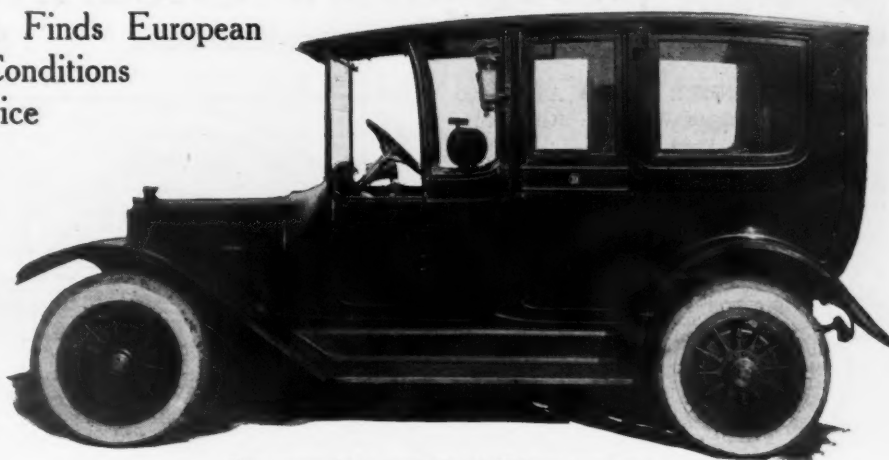
Within the past few weeks there have been some very important changes made in certain features of the car which show that the experience of the taxicab company points to designs of European rather than American origin. The chief alteration is in the substitution of the worm-driven rear axle for the bevel drive employed previously. This change was made solely to gain more silent operation, a point of importance in this service. The adoption of this drive has made possible another change which makes for simplicity of construction. With this system both torque and radius rods are eliminated and the springs are built to stand the additional thrust and torque incurred by accelerating and braking the car.

## Emergency Brake on Transmission

In connection with the brakes a strictly European idea is employed in the installation of the emergency brake on the transmission shaft just behind the gearset. This eliminates the extra rods and linkages necessary with the conventional location on the wheels and does away with the attendant rattle and wear. The drum for this brake is 8 inches in diameter



Emergency brake on the propeller shaft back of the gearset on Shaw taxis



New worm-drive taxicabs of Chicago concern

and is exceptionally wide, being 4 inches across the face and the band is lined with Raybestos.

The service brake is retained on the rear wheel, the reason for this being that with the frequent application of the service brake required in city traffic too much wear would be imposed upon the rear axle and propeller unit if all the braking strain were to be transmitted through them to the wheels.

## Adopt Left Drive

Shaw taxicabs hereafter will be operated from the left side, right drive having been former practice. This change is made in spite of the fact that with the right drive the driver can reach around and open the doors on the curb side without leaving his seat and also is more handy to assist the passengers in entering and alighting from the cab. The reason of the change has been the paramount one of safety, as the company's tests have shown that accidents are one-third less with the left drive than they are with the right drive. This corresponds with the finding of the Yellow Taxicab Co. of New York as developed at the last S. A. E. meeting.

These comprise the alterations in the new chassis, which, like the design of the chassis as a whole, are the product of Paul H. Geyser, mechanical engineer of the company. The motor used is of the four-cylinder vertical, L-head, block type of  $4\frac{1}{8}$  by  $5\frac{1}{4}$  cylinder dimensions. The valves are inclosed and have an nominal diameter of 2 inches. The push rods are adjustable and present flat surfaces to the cams. The camshaft is forged integrally and is driven by helical gears in a separately inclosed compartment, the starting crank is mounted on extension of the gear compartment cover so that no bracket is required on the frames.

## Triple Oiling System

Lubrication is provided for by both constant-level splash and force feed, the motor being equipped with two plunger pumps actuated by eccentrics on the cam-

shaft. The bottom half of the crankcase is removed for the inspection or adjustment of connecting rods, camshafts and so forth without disturbing the crank bearings. Cooling of the motor is by thermo-syphon to a cellular radiator mounted on trunnions attached to side members of the frame. A Schebler carbureter and a fixed-spark Bosch magneto are employed.

The clutch is of the dry-disk type, the disks being ten in number, steel and raybestos alternating, and are engaged an adjustable coil spring and provided with a clutch brake to permit easy gearshifting. The gearset is a three-speed Brown-Lipe model mounted on Timken bearings. Throttle control is by an accelerator pedal so that there are no levers on the steering wheel. Two Spicer universals are used between the gearset and the rear axle which is one of the Timken, worm-drive floating type.

## Quick Repairs a Feature

In general, the construction throughout looks to universal interchangeability, all holes in frames, housings and all other parts are accurately jigged so that new parts can be substituted at a moment's notice. Gearset, motor and clutch are separate units so that each can be demounted quickly without disturbing the others; for instance the gearset is so arranged that removal of the ten bolts by which it is suspended, allows the gearbox to be removed while the removal of six bolts permits the entire power plant to be slipped forward and out of the chassis. This includes the motor, radiator and entire lubrication and ignition system of the cars.

Simplicity of operation has been reached by clearing the steering post of all controls, at the same time provision against breakdowns has not been overlooked; for instance the two lubricating pumps can be worked independently of each other and in case both fail sufficient lubrication for a 60-mile drive is provided in the splash compartment reservoir.





# The Readers' Clearing House



## NO SIX-CYLINDER SELLS AT \$1,250 Reader in Rhodesia Wants a "Glorified" Ford Car

**SALISBURY, RHODESIA**—Editor Motor Age—Kindly inform me if there is a car of the following specifications on the American market? Touring type, five-passenger, weight not more than 2,000 pounds, six cylinders, cost not to exceed \$1,250 f. o. b. American port. The machine I have in mind is a sort of glorified Ford, six cylinder, high-tension magneto and a proper lubricating system. This should be an ideal machine for the raw back roads such as are characteristic of this country. This does not necessarily have to be fitted with a self starter or power pumps.—Westland Gordon.

There is no six on the market selling at \$1,250. The nearest to this is the Buick six, selling at \$1,985; Correja, at \$1,800; Havers, at \$1,985; Herreshoff, at \$1,850; Studebaker, \$1,575; Hudson, \$1,950; Lewis, \$1,600; Meteor \$1,600; Mitchell, \$1,895; Oakland, \$1,785; Ohio, \$1,985; Richmond, \$1,500.

## MASTER VIBRATOR ON A FORD CAR

### Advantages of the Installation—Gearset of the Same Car Explained

**Kosciusko, Miss.**—Editor Motor Age—Kindly explain by diagram the assembly of a 1913 Ford transmission.

2—What is the cause of a 1912 model 59 Overland slipping intermediate gear when pulling?

3—Kindly explain the wiring of a master vibrator and what is the advantage of one?

4—What clearance has the 1914 model 32 Hupmobile?—C. R. Evans.

1—The Ford transmission system is shown in Fig. 1 and is known as a planetary set. As will be noted there are three triple gears and when in second speed these gears as well as the other are stationary and the entire system revolves as a unit. On first speed the triple gears revolve on their own axis. The different speeds are obtained by pressing pedals which control bands or drums; which in turn stop the rotation of the parts. Thus for slow speed the pressing of the drum permits the triple gears to revolve upon their own axis which means that the motor turns over rapidly but the car slowly. On high the drive is direct and the whole gearset turns.

2—The shifter shaft is notched so as to receive a plunger backed by a spring and when the spring has lost its tension the plunger will not seat properly and thus hold the gears in mesh. When the teeth of

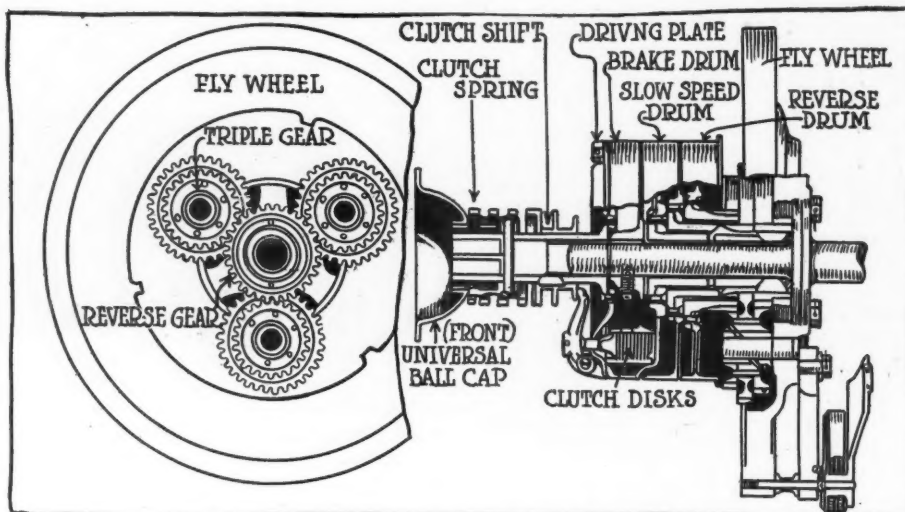


FIG. 1—TRANSMISSION OF THE FORD CAR

Showing the relation of the gears in the planetary set and the bands which control the forward speeds and reverse. The triple gears may revolve upon their own axis but when in high speed these gears do not revolve

the gears are worn excessively it is difficult for them to remain in mesh.

3—The master vibrator coils take the place of the separate vibrators on the four-unit coils and give one fast and powerful vibrator and condenser for all of them, thus assuring synchronism with a smoother running engine and more power it is claimed. They will operate in connection with either batteries or low-tension magneto current generator or both and with any make of coil; it simply being necessary to short-circuit the vibrators and let the master vibrator, which is contained in a separate box, work for all cylinders. The master vibrator may be connected in between the source of current and the coil, as shown in Fig 2.

In wiring it up you must short-circuit the vibrators on the four-unit coil so as to cut out the use of the condensers and vibrators of the present coils, thus allowing the master vibrator to interrupt the circuit for each unit in turn just as the timer closes the circuit. The master vibrator, it is claimed, gives far more flexibility to the engine, permitting the car to run slower on high gear, and due to the increased synchronism more power from the engine is obtainable at all speeds. Considerable economy in battery current also is claimed for its use.

4—About 9½ inches.

## HERNE REPLIES TO A. D. CARPENTER Discussion on Low Against High-Tension Ignition, Continued

**Chicago**—Editor Motor Age—I should very much to reply to A. D. Carpenter's letter appearing in Motor Age, issue of January 8, regarding high-tension ignition.

In the first place Mr. Carpenter asserts that my article in reply to his first one on low-tension ignition was entirely uncalled for, and I must say that I fail to see why this is so. He wrote an article unholding low-tension ignition for motor cars with which I did not agree, so I replied, giving my views on the subject, which is surely in order, as Mr. Carpenter cannot claim to be the only one having a right to opinions on this subject. And, moreover, I gave reasons for all my statements which Mr. Carpenter up to the present has failed to do.

In his last letter Mr. Carpenter says he does not wish to go into details regarding either system of ignition. Now this is exactly what I did do in my last letter, because it is only by going into details and

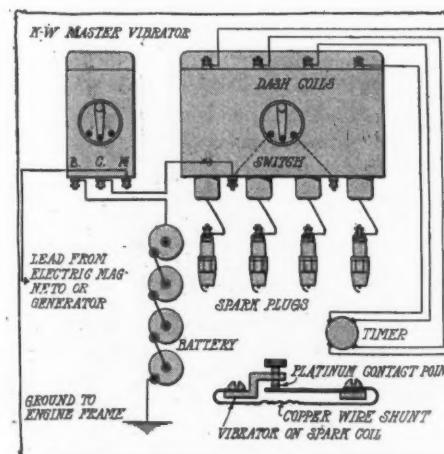


FIG. 2—MASTER VIBRATOR INSTALLATION

The K. W. instrument as incorporated in a Ford car. The advantages of the master vibrator are given in the text

## Questions Answered and Communications Received.

Westland Gordon... Salisbury, Rhodesia  
C. R. Evans... Kosciusko, Miss.  
Donald Herne... Chicago  
J. B. Halpin... St. Louis, Mo.  
F. F. Sergeant... Belvidere, Ill.

No communication not signed with the reader's full name and address will be answered.



comparing one system with the other that any decision can be arrived at. He does state, however, that one of our finest cars is equipped with low-tension ignition, but fails to give the name. I suppose that the most popular cars in this country over a large range of prices are the following: Simplex, Peerless, Pierce-Arrow, Locomobile, Packard, Lozier, Stevens-Dureya, Hudson, Chalmers, Cadillac, Studebaker, Buick, and Ford, this being just a list that happens to come to my mind. Does anyone of these make use of low-tension ignition? No, sir.

I did not forget, as Mr. Carpenter states, that a number of firms have not given up the low-tension system. I distinctly stated that many have given it up, and proved my assertion by giving an instance.

The description of the recent patent on a make-and-break spark plug is very interesting indeed, but the fact of it sparking in oil or water is nothing new. If Mr. Carpenter will visit the accessory exhibits of any motor car show he will see any number of spark plugs firing under water and oil, and this with the high-tension ignition. Also with a six-cylinder motor running at 1,800 r. p. m. and any of them will do better than this, there would be 5,400 sparks a minute, and the high-tension gives no trouble at this and much higher speeds, in fact I was present personally at a test of a single-cylinder motor-cycle engine of the four-cycle type which attained the high speed of 4,800 r. p. m., which means 2,400 sparks per minute from one plug. This also was with a high-tension ignition system. In fact as far as ignition is concerned there is practically no limit to the speed which can be attained, it becomes a problem of drawing in the charge fast enough and then getting rid of it.

Mr. Carpenter wishes to know why, if the present high-tension plugs are any good, there are so many on the market all claiming to be the best. I really think that this is childish argument. The reason is the same as why every car is claimed to be the best, every tooth-paste is claimed to be the best, and every article made in this world is claimed to be the best by the firms who make them. If high-tension

plugs were no good nobody would be making them, for the simple reason that they would have been out of business long ago.

It most certainly is worthy of note that high-tension plugs have run thousands of miles without being even inspected, while Mr. Carpenter's experience of having to renew one before the car even left the garage is not worthy of any notice because he probably jammed the points together or broke the porcelain when putting it in; these things require to be handled sensibly.

In concluding, I certainly agree that what we require are facts, and I should like to see Mr. Carpenter give some. An argument over a subject like ignition, when facts are given, is apt to be both interesting and instructive, and in my last article I gave a number of facts which were ignored by him. With reference to the personal remark about my posing as an expert, it might overwhelm Mr. Carpenter to hear that one of the largest firms in Chicago is, and for some time has been, paying me quite a good salary in that very capacity. It certainly is extraordinary how some people throw their money away.—Donald Herne.

#### ADVANTAGES OF ASSEMBLED CARS Parts Made by Specialists Said to be Better Than Those Made in One Shop

Belvidere, Ill.—Editor Motor Age—About how many different makes of motor cars are there in the United States?

2—What percent are assembled cars?

3—What are the advantages and disadvantages of assembled cars? Of non-assembled cars?

4—What are the advantages and disadvantages of a cone clutch? Of a disk clutch?—F. F. Sergeant.

1—There are about 165 makers of cars, excluding cyclecars.

2—The exact number cannot be ascertained, but it may be stated that few makers build their car entirely in their own shops.

3—Those who favor the assembled car state that it is better because the parts are made by specialists who are better able to make parts than a factory whose attention is directed to a number of parts. The assembled car is said to be better also because the failure of the maker does not mean that repair parts cannot be obtained for the makers of the parts still may be in business. The assembled car being made by specialists who manufacture in quantities, usually costs less to build than one made in a single shop.

The adherents of the non-assembled car state that, since every part is made and fitted in one shop there is little chance for error. Each part may be tested separately and mistakes corrected, immediately, whereas the assembled-car maker sometimes has not the facilities for making these corrections. It is stated that non-assembled cars are more uniform than the assembled, for the parts being made in one shop may be fitted better. The makers of assembled cars claim that they employ specialists in their departments

and that when a motor is produced it is the result of artists' work.

4—Users of cone clutches claim simplicity, low first cost and low maintenance, while the adherents of disk clutches contend that their product is more efficient than the cone, does not require as much care, permits of more gradual starting and is smaller.

One of the asserted disadvantages of the cone clutch is that it spins, or rotates when released, making gear-shifting difficult, but the use of clutch brakes has largely done away with this. The disadvantages as stated are that the disk clutch has many more parts than a cone and is not usually understood by the car owner. It costs more than a cone, in many instances and when poorly designed needs more attention. Repairs are said to be greater for a disk than for a cone clutch.

#### ADJUSTING RAYFIELD CARBURETER Type as Used on the Chalmers Known as the Model D

St. Louis, Mo.—Editor Motor Age—How is the Rayfield carbureter as used on the 1912 Chalmers 30 adjusted?—J. B. Halpin.

The 1912 Chalmers used the model D Rayfield. The working parts are shown in Fig. 3 and the method of adjusting this carbureter is as follows:

To determine the position of the needle valve L in relation to that of the throttle, the dash adjustment is placed in the neutral position, which may be determined by observing that the cam M is out of contact with the low-speed screw N. This screw is next unscrewed until needle-valve arm begins to leave contact with the cam. It should then be turned to the right, one and one-half turns. The automatic air valve is then adjusted by unscrewing its exterior adjustable seat  $\frac{1}{8}$  inch. The motor is then primed and started, with the throttle set about one-fourth open. Upon starting it is throttled as slow as it will run, when the low-speed lever is turned one notch at low speed. If the throttle does not close sufficiently to permit slow speeds, the throttle stop on the reverse side of the carbureter may be unscrewed until it does. The low-speed adjustment being obtained, the motor is run until warm, when it is tested by pressing on the automatic air valve at P very gently with a pencil or like instrument. If the motor speeds up the mixture is too rich and should be thinned by turning the low-speed screw to the right until the motor begins to slow down.

The low-speed adjustment being right, the throttle is opened suddenly to see if the motor speeds up. If it is sluggish or pops back into the carbureter, the high-speed adjusting screw O is turned to the right until the fault is remedied. If after having screwed this adjustment all the way up the motor continued to pop back into the carbureter, the nozzle is too small. If at intermediate speeds the motor backfires, the adjustable air valve seat should be turned to right, decreasing the quantity of air at a given speed.

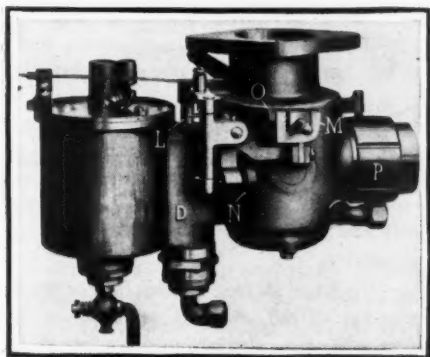


FIG. 3—RAYFIELD MODEL D CARBURETER  
Showing the adjusting points. O shows the high-speed screw and N the low-speed adjustment





# Cyclecar Development

## Maker Points Out Economy Features of the Cyclecar

**D**ETROIT, Mich.—Editor Motor Age—You have heard the skeptic say about any new article which has come on the market "It may be all right but who will buy it, what is it good for?" Some are saying that same thing about the cyclecar.

The writer gave up a very profitable retail business to enter the manufacture of these cyclecars and as far as the market is concerned, can see no limit to the industry. Everybody who walks or rides in a street car is a live prospect for one of these cars. This is an era of prosperity, prosperity for the working man in particular. From the pleasure end of it alone let us consider this field.

To thousands, yes even to millions, has been denied the joy of the motor car, due to the cost of maintenance. A great many people who could well afford the first cost of one of the popular makes of motor cars were unable to maintain them after they were bought. The cost of a blown tire alone was enough to scare away a good many car buyers.

Just consider that the average cyclecar tire costs only about \$7.50 and the weight of the car is so little that the average

mileage is in the neighborhood of 10,000 miles. A gallon of gasoline will carry this car about 40 or 50 miles and a gallon of oil will usually do better than 800 miles. Thus is the cost of upkeep reduced to the minimum.

A \$10 bill every month will well care for these cyclecars. Let us just consider a man's expense in running one of these little cars through 12 months at an average of 1,000 miles a month.

240 gallons gasoline at 15c.....	\$36.00
15 gallons oil at 50c.....	7.50
Two extra tires at \$7.50.....	15.00
Two extra belts at \$7.50.....	15.00
Repairs and garage service.....	....
	<b>\$73.50</b>

From a strictly business standpoint, a man drives a car for transportation purposes only. He necessarily wants the cheapest form which is obtainable to make his investment pay the biggest percentage of profit. The cyclecar is the logical answer. This form of transportation is cheap, it is comfortable, it is safe and entirely in keeping with the most dignified of business or professions. You cannot keep clean on a motorcycle, you cannot maintain a degree of dignity, but you can in a

cyclecar as well as in the most perfectly appointed touring car.

The Mercury Cyclecar Co. is offering, in addition to its regular tandem model, a single-passenger type which undoubtedly will find favor with the many corporations and big business houses which now furnish cars to their employees and which are constantly confronted with the big problem of joy-riding. This joy-riding feature is eliminated entirely by the use of the single-passenger car.

The different fields mentioned above no doubt will take the entire output of all the cyclecar factories for some time to come. The delivery possibilities have not been touched upon, but this field offers a world of opportunities. No doubt this model will become a leading product within a very short time.

We have pinned our faith in the cyclecar on account of its merits, merits which are apparent from every standpoint. We predict that within a very short time this industry will outstrip both the motor car and the motorcycle industries combined.—Mercury Cyclecar Co. By R. C. Albertus, sales manager.

## Answers to Inquiries by Readers Concerning Cyclecars

### GIVES SPECIFICATIONS OF HIS CAR

**Reader Inclined Toward Underslung Springs—Transverse Springs Good.**

**C**HICAGO—Editor Motor Age—I am much interested in the cyclecar development and am planning to build one. I weigh a little over 200 pounds. Does Motor Age think that weight too much for a strongly constructed cyclecar to carry?

2—The specifications are as follows: wheelbase 30 inches; for I am going to make it a single-passenger vehicle; tread 36 inches; width of frame 16 inches; front axle I-beam; tubular rear axle; chain drive from De Luxe motor to the jack-shaft; rubber V-belt from the jackshaft to the rear; frame 2 by 3-inch white oak or ash lined with 3/16 by 3-inch sheet steel, having 1/4-inch bolts placed 10 inches apart holding it to the frame. Does Motor Age think that a free engine clutch on the motor would serve as a transmission? Is the frame too narrow?

3—Suggest some method of steering, not by wire cables. Also, some method of underslung spring suspension. I had thought of transverse springs as the best.

4—Give some method of attaching the springs to the frame and the axle.—A Subscriber.

1—Two-hundred pounds is not by any means too great weight for a strongly constructed cyclecar.

2—This layout is correct for the main specifications, however, two V-belts should be used. The frame should be narrower and deeper, say 1 by 4 inches, and need only be re-inforced at joints. The free engine clutch would be satisfactory for a single-seating car in a very level country,

but if the machine has a single gear it will be harder to make any considerable speed and will need to be geared 6 or 7 to 1. For this type of car it might be well to follow the construction of the Monorail car made in England, this being very light and handy and easy to make.

3—Instead of steering cables, 1/4-inch bicycle chain may be used for steering connections. The transverse spring system is wonderfully good and if used the centers of the springs should be fastened to a casing at the front of the car, this casing forming the front end of the body and frame. The rear of the spring sets should be at least 3 1/2 inches.

4—The underslung may be had at the rear by using the ordinary type of cantilever spring suspension, the support rod of the same passing above the frame of the car. In this you need follow merely motor car practice.

### FOUR-CYLINDER NOT SUITABLE

**Larger Flywheel Not Advised—Kick Starter Best**

Lakota, N. D.—Editor Motor Age—I have a two-cycle single-cylinder air-cooled motor with 3 1/2 inch stroke. What is the horsepower supposed to be? The weight is 135 pounds. Would this motor be suitable for a cyclecar motor?

2—I have a four-cylinder Pierce-Arrow motorcycle motor which I intend to use in a cyclecar. Would a larger flywheel make this motor so it could be throttled down to run slower without stopping? About what weight and diameter would be best for it?

3—Would a dynamo motor of 1/4 horsepower be sufficient for a starter for this motor?

4—If a storage battery is used what gear ratio would be necessary for a starter of this kind, and what gear ratio would be best when using the motor as a dynamo for charging the battery?—B. K.

1—The power of the motor you mention will depend entirely upon the normal r. p. m., but will probably not develop over 3 horsepower in ordinary running. The flexibility of the type mentioned is ordinarily deficient.

2—The four-cylinder motorcycle motor would hardly fit a cyclecar proposition. It is probable that the inability to run slow is due more to make than to the small flywheel and you might fit a battery system to try this out. A larger flywheel would throw many strains on the gear-shift and connecting rod and would not be advisable.

3—To fit a starter to this motor would be like killing mosquitoes with a pile driver as the starter mechanism would weigh more than the motor.

4—A motor of this type is so light that a hand or kick starter is all that is necessary.



# The Motor Car Repair Shop

## Reading Electric Meters

**A**CCURACY in reading electric meters is a thing sought after, but very few of the garagemen read voltmeters and ammeters correctly. In order to obtain true readings the indicating needle must be viewed in line with its reflection in the mirror which is part of the instrument. Some meters are not equipped with mirrors, owing to the fact that the work they are designed for does not acquire great accuracy. At C in the illustration the needle and reflection are not in line and a reading taken would not be correct. One eye should be closed and both needle and reflection directly in line before the scale is read. Another important point often forgotten in taking readings, is the meter correction. Very few instruments are in use which tell the voltage or amperage accurately. A correction card should be obtained which tells the variations of the meter at various points in the scale. It often is necessary to check the meter against a standard or a potentiometer.

It may be said in this connection that electric instruments are injured mostly due to negligence. Before a meter is connected to a circuit one should determine the line voltage and whether the current is direct or alternating. A plate on the meter tells whether it is a direct or alternating current meter and the scale will indicate its capacity.

## Carrying Dry Cells

A very convenient method of carrying dry cells is shown at D in the illustration. The small sacks at the bottom of the cells are made of pieces of an old inner tube. This affords complete insulation and consequent long cell life. The cells should not be placed so that the sides touch each other and if necessary each unit should be bound with paper.

## Correct Filing Method

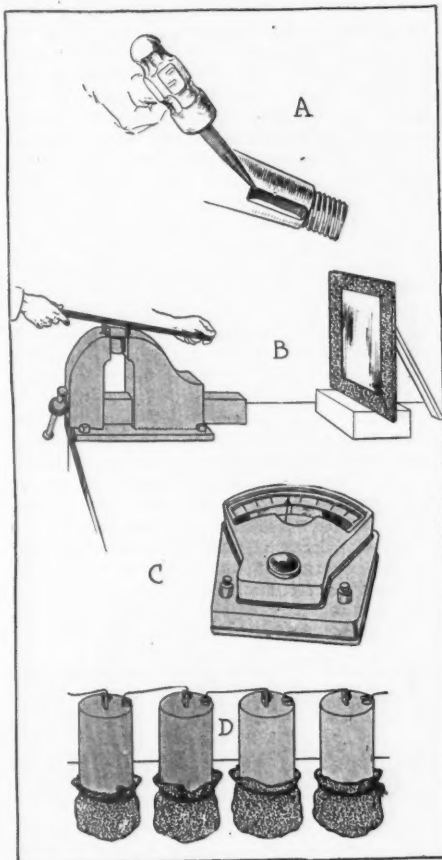
It is evident that to file a flat surface the file must be held perfectly flat, and although the operator imagines he is doing the work properly, often the file is held at an angle and the work spoiled. A good method of ascertaining whether or not one is filing correctly is to place a mirror before the vise as shown at B in the illustration on this page. After watching the work for some time one will get accustomed to holding the file flat.

## Fitting Axles Keys

Many makes of cars employ keyed axles, that is, axles fitted with keys which hold the wheel in place. Improper initial fitting often causes the key to rock in the keyway and if the condition is permitted to continue, the entire keyway will be spread. This means fitting oversize keys or replacing the axle shafts. When there is slight

## Helpful Hints for the Amateur

play between the key and its guide a makeshift repair is affected by pricking punching the keyway as shown at A in the illustration on this page. However, at the first opportunity a larger key should be fitted.



### HELPFUL HINTS TO MOTORISTS

A—Center punching the keyway of an axle so as to hold the key more secure. This is recommended as a temporary repair, for at the first opportunity a larger key should be fitted.

B—Learning to file properly by watching the work in a mirror. The file must be held flat and although the operator thinks he is working properly often the file is held at an angle as shown.

C—In reading electric meters one eye should be kept closed and the indicating dial viewed in line with its reflection in the mirror which is part of the instrument.

D—A convenient method of carrying dry cells to prevent them from becoming exhausted quickly is here shown. Pieces of old inner tube are wrapped around the bottom of the cells.

A loose key may cut the keyway sufficiently so that the key will ride on the axle and in a case reported recently a Hupmobile 20 with loose keys cut the keyway so much that the wheels would not turn.

## Removing Grease From Painted Parts

When the polished parts of a car become covered with grease, it is a difficult matter sometimes to remove the grease without injuring the paint, as most grease removers which are recommended, contain

substances which carry some of the paint along. A very effective means of removing the grease is to rub the parts with a paste of water and ordinary whiting. This is permitted to dry and then it is rubbed off with a clean cloth. It will be found that the grease will be removed with the whiting.

## On Differential Adjustments

Owners complain now and then that the rear axle of their car makes a howling noise and that only recently new grease was placed in the housing and the grease was heavy so as to quiet the gears. When there is excessive backlash, or play, between the driving pinion and differential gear noise will be heard and no matter how thick the oil is the noise will be heard as soon as the oil becomes hot and thins. Another cause of gear howling is due to what is termed an out of round. This means that the gears are not running true. There may be a high spot on one or more of the gear teeth. In the first case mentioned there is a remedy, but in the latter the gears must be removed and perhaps replaced. The cure for too much backlash is to readjust the driving bevel or differential gear so that the two mesh closer. Nearly all differentials are provided with a means of adjustment, but if one is not familiar with making the adjustments he had better give the job to a repairshop or service station. When an out of round is present the gears must be examined and the defective tooth or teeth trued up. Usually the gear room of the factory does this work. If the entire gear is out of round, only replacement will make the differential operate quietly.

Sometimes a rumbling sound will be heard on coasting. This condition is called a bad coast and may be due either to an out of round of too much backlash. In measuring backlash a distance of about .015-inch is allowed. However the figure varies with different makes of rear axles.

## Watching Leaky Spark Plugs

It is not always certain whether a certain spark plug is leaking through the porcelain, and a good way to determine which plug is wasting electricity is to run the motor in a dark room. If the plug is leaking the spark may be seen jumping the break in the porcelain or mica as the case may be.

## Cylinder Leaks Stopped

The gasket under the spark plug often causes a slight leak by holding a piece of dirt against the countersink. The dirt, even though it be very small may cause the gasket to permit gas to leak out around the spark plug. When replacing the plugs it is well to clean the gasket and its seat thoroughly.





# From the Four Winds



**MORE Cars Than Horses in Oakland**—Oakland, Cal., has approximately 9,000 more motor cars than horses, according to statistics compiled by the Oakland street department.

**Rewards for Vigilant Policemen**—The Automobile Club of Kansas City has adopted a system of rewarding patrolmen which is rapidly clearing the streets of broken glass. The club gives to each patrolman who arrests a person for throwing glass upon the street a sum equal to that which the arrested person is fined in police court. In December a total of \$200 was paid out in this way. It is found that most of the glass on the street is due to bottles thrown out of joy-riding motor cars.

**Logging Texas Military Highway**—Plans have been completed for the logging of the proposed military highway along the Rio Grande from Eagle Pass to Brownsville, Tex. A motoring party headed by D. E. Colp, secretary of the Bexar County Highway League, left Brownsville January 16 and will log the proposed road to Eagle Pass, which will be about 430 miles long, gathering all available data to present to the committee on military affairs of Congress, which has been asked to aid the proposed highway.

**Washington Counts Its Motor Cars**—All records for registration of motor vehicles in the state of Washington were shattered when Secretary of State I. M. Howell reported a total of 24,178 machines licensed at the close of business on December 31. The year of 1913 showed a gain of 9,696 cars. In 1910 there were 6,013 cars licensed. In 1911 the total reached 10,316; in 1912 registration of 14,482 cars were made and in 1913 the figures jumped to 24,178, the greatest increase since the records have been kept by the state.

**Hoosiers Plan Safety Campaign**—A public safety policy for the ensuing year has been outlined by the Hoosier Motor Club, Indianapolis. A campaign of education is to be conducted and the police will be asked to enforce the traffic regulations. Members of the club and other motor car owners will be asked to show the traffic officers respect and join in the enforcement of the traffic laws and ordinances. "Safety lesson" leaflets, similar to those used in Baltimore, to educate school children are to be distributed among the public and parochial schools of Indianapolis. In addition, the club plans to spend money in newspaper advertising, pointing out the desirability of observing and enforcing traffic regulations.

**More Motor Cars than Grass Hoppers**—There is an average of one motor car for every forty-eight persons in the state of Kansas. Figures just made public by the secretary of state in Topeka show that 34,945 cars are owned in the state. In some counties there is a car for every fourth family and in many for every fifth and sixth family. Edwards county leads in this respect with a motor car for every twenty-one persons. The opposite is struck in Sheridan county where with a population of 4,524 there is a car only for every 168 persons. Sedgwick county leads in the total number of cars owned, having 1,995 within its boundaries, a car for each thirty-nine persons. Reno county, with 1,311 cars, or one for every twenty-nine persons, is second in the total number owned. The Kansas motor cars represent 253 different makers. Of these the Ford is by far the largest, numbering 9,477. The Buick is second with 4,198;

Overland third with 2,698; Reo fourth with 1,801; Studebaker fifth with 1,529, and Maxwell sixth with 1,402. No other make is represented by more than a thousand.

**Hoosiers Forming Cyclecar Club**—One of the first cyclecar clubs in the United States is being organized in Indianapolis. The organization plans are in charge of Fred P. Merz, who has opened quarters at 308 Century building in that city. The little cars promise to be popular in Indianapolis.

**Connecticut Motorists Have Pull**—In the opinion of Secretary of State Albert Phillips, the big cities in Connecticut are lax in the detection and arrest of violators of the motor car law charged with not having secured new numbers. Of the fifteen motorists before the Hartford police court a few days ago, not one was fined. The prosecuting attorney said that each had a good and reasonable excuse, therefore he requested that the action be dropped. The secretary of state scores the police departments in the large cities.

**Declare War on Car Thieves**—Southern California motorists are to be protected with the first Theft Committee ever organized. It will be a concerted effort by the twenty-six fire and marine insurance companies in California. District Attorney Fredericks will co-operate with the Theft Committee as well as Chief Sebastian of the police department. On the committee, which will bend its efforts to the apprehension of all motor car thieves south of the Tehachapi, are representatives of two well-known insurance companies and a representative of the Automobile Club of Southern California. Leo L. Gibson has been elected chairman of the committee, with

George D. Gilmore as vice-chairman and Van Alostyne, secretary.

**Show Attracts 115 Exhibitors**—One hundred and fifteen exhibit spaces have been sold for the seventh annual motor car show in Minneapolis, January 31-February 7, covering 70,000 square feet in the national guard armory and annex. This insures one of the largest shows in the West and the highest in the Northwest. It will be the second national show to be held in Minneapolis. Dealers in the Twin Cities believe that all sales records will be broken when the show closes.

**See Battle from Motor Cars**—The recent attack of the constitutionalists on the town of Nuevo Laredo, held by the federals, and situated directly across the Rio Grande from Laredo, Tex., attracted large numbers of motoring parties from all parts of Southwest Texas, who came to witness the battle from Laredo. A number of motorists came from San Antonio, 150 miles, and from points between San Antonio and the Gulf coast.

**Ohio to Assist Road Builders**—A delegation of thirty men from Cuyahoga, Lorain and Erie counties, including the commissioners of those counties, received assurance from Governor Cox recently that the state of Ohio will assist in the building of the lake shore road running from Cleveland to Sandusky. The governor accepted the offer of the delegation to furnish two-thirds of the \$700,000 which the road will cost, if the state will supply the other third from the funds raised by the one-half mill levy of Nuevo Laredo, held by the federals and provided by the Hite law. Work will be started early this spring.

## Recent Incorporations

**Arcade, N. Y.**—Arcade Motor Car Co., capital stock, \$15,000; to deal in motor vehicles; incorporators, K. R. Wilson, F. R. Wilson, A. M. Wilson.

**Bay City, Tex.**—Bay City Auto & Sales Co., capital stock, \$7,500; incorporators, M. Thompson, F. A. Thompson, W. D. James.

**Boston, Mass.**—Smith Tire Valve Co., capital stock, \$10,000; incorporators, J. H. Smith, R. L. Robbins, E. D. Fullerton.

**Boston, Mass.**—Vendome Taxicab Co., capital stock, \$50,000; incorporators, A. Rosenfeld, D. Litvon, M. May.

**Boston, Mass.**—Milton Tire & Rubber Co., capital stock, \$40,000; incorporators, P. L. Hardy, C. M. Riddock.

**Chicago**—Automobile Fender Equipment Co., capital stock, \$25,000; to manufacture and deal in fenders; incorporators, C. M. Baldwin, F. N. Suttle, F. H. Towner.

**Chicago**—Roseland Auto Sales Co., capital stock, \$10,000; incorporators, R. J. Ton, V. A. Beckman, M. Otto.

**Chicago**—Saxon Motor Co., capital stock, \$5,000; incorporators, D. Coleman, T. M. Whitson, S. G. Levy.

**Cleveland, O.**—M. Richard Automobile Co., capital stock, \$250,000.

**Dallas, Tex.**—Southwestern Motor Sales Co., capital stock, \$200,000.

**Dallas, Tex.**—Quick Tire Service, capital stock, \$10,000; incorporators, H. L. Williford, K. B. Young, K. A. Ward.

**Detroit, Mich.**—Signal Motor Truck Co., capital stock, \$60,000; to manufacture motor cars.

**Dover, Del.**—Corsair Motor Co., capital stock, \$25,000; to manufacture motors; incorporators, J. M. Satterfield, W. P. Carrow, M. M. Hiron.

**Dover, Del.**—John G. Funk Air Springs Co., capital stock, \$10,000; to manufacture and deal in air springs, etc.; incorporators, R. Clough, W. I. N. Lofland, W. F. P. Lofland.

**Easton, Pa.**—Midwest Motor Truck Mfg. Co., capital stock, \$500,000; incorporators, J. C. Potts, P. L. Carrett, E. C. Boyd.

**Ft. Wayne, Ind.**—H. G. Raymond Automobile Co., capital stock, \$20,000; incorporators, H. G. Raymond, C. Schlefer, W. W. Bogart.

**Ft. Wayne, Ind.**—Fort Wayne Auto Supply Co., capital stock, \$50,000; incorporators, J. M. Cramer, J. A. Brewer, H. H. Criswell.

**Houston, Tex.**—Co-operative Automobile Co., capital stock, J. H. Cutten, F. E. Sweeney, M. S. Murray.

**Lynn, Mass.**—Broadway Garage, capital stock, \$1,000; incorporators, J. L. Swan, Wm. O. Swan, G. E. Crosby.

**Milwaukee, Wis.**—Stanley Steamer Co., capital stock, \$15,000; incorporators, J. C. Coxe, W. W. Burgett, E. S. Durham.

**Milwaukee, Wis.**—Wisconsin Welding & Cutting Co., capital stock, \$10,000; general welding and cutting business; incorporators, S. H. Smith, W. Wiesner, L. L. Well.

**Newark, N. J.**—Empire Tire & Rubber Co., capital stock, \$1,000,000; to manufacture rubber goods.

**Newark, N. J.**—C. J. Cross Front Drive Tractor Co., capital stock, \$100,000; to manufacture motor cars; incorporators, C. B. Cross, J. W. Powelson, W. E. Holmwood.

**New York**—Duplex Tire Co., capital stock, \$1,000; to repair tires; incorporators, J. E. Finney, C. Martin, J. Martin.

**New York**—Boylston Garage, capital stock, \$900; incorporators, W. H. Boylston, G. A. Boylston, E. S. Boylston.

**New York**—Ladlaw Co., capital stock, \$3,000,000; to deal in motors; incorporators, C. E. Eaton, L. H. Reed, C. L. Hepburn.

**New York**—Helix Tube Co., capital stock, \$250,000; to manufacture motor car tires; incorporators, G. C. Howard, C. S. Houghton, J. D. Gabler.

**New York**—Double Tread Tire Co., capital stock, \$1,000; to deal in tires; incorporators, J. Martin, G. A. Martin, J. Schwartz.

**New York**—Motor Car Spring Co., capital stock, \$75,000; incorporators, S. Otter, B. Frankel, J. Prosky.

**New York**—Washington Auto Parts Co., capital stock, \$1,500; incorporators, J. Dunn, M. Rosansky, A. Sachnoff.

**Sea Cliff, N. Y.**—Senrab Carburetor Co., capital stock, \$25,000; incorporators, L. I. Barnes, E. H. Madison, T. H. Hageman, Jr.

**South Bend, Ind.**—Colliseum Garage Co., capital stock, \$10,000; to conduct garage business; incorporators, J. Walz, W. P. Furey, J. Elmer Peak.

**Syracuse, N. Y.**—Elasto Co., capital stock, \$30,000; to manufacture tire filler; incorporators, J. G. Ellendt, A. T. Bradley, H. G. Kennedy.

**Trenton, N. J.**—Central Garage, capital stock, \$50,000; general motor car business; incorporators, W. F. Cubberly, C. C. Moore, A. W. Sukes.





# Among the Makers and Dealers



**MAY Move to Carlisle, Pa.**—The Superior Specialty Co., of Philadelphia, manufacturing a double-contact ignition device as well as the Superior motor car, is considering locating at Carlisle and engaging in the manufacture of its products at that place.

**Wise With Toledo Rubber Co.**—Edward M. Wise, formerly connected with the Garford Co., of Elyria, O., and later with the Willys-Overland Co. and Carl Electric Vehicle Co. of Toledo, O., has become manager of the accessories department of the Toledo Rubber Co.

**Bowser Pacemakers in Convention**—The annual convention of the Pacemakers Club of S. F. Bowser & Co., maker of gasoline tanks for motor cars, was held recently at Fort Wayne, Ind. A. Z. Polhamus, general manager of the company, announced that sales for 1913 had fallen just a trifle short of the \$4,000,000 mark. Six thousand dollars were distributed among the salesmen for increasing their volume of business.

**New Truck Factory Secured**—The Morton Truck and Tractor Co., of Harrisburg, Pa., has purchased the three-story brick building on Nineteenth street, formerly occupied by the Model Typewriter Co., and will move into it about February 1. The company will build a heavy truck it now handles. The building which is practically new, will be remodeled and will afford ample facilities for the Morton company. The factory is located along the tracks of the Philadelphia & Reading railway. The capital stock of the Morton Truck and Tractor Co. has been increased from \$250,000 to \$300,000.

**Kansas City Get Vaporizer Plant**—A company whose capital stock will be \$100,000 is being formed at Kansas City, Mo., to take over the manufacture of the Imperial vaporizer, which now is being made in Des Moines, Ia., by the Imperial Mfg. Co. The factory will be moved to Kansas City as soon as the incorporation details are worked out. The organization is being perfected by Charles M. Donback, president of the company. Permanent headquarters have been obtained at 206 East Sixteenth street where a service station has been opened. N. H. Spitzer is sales manager.

**Reading Gets Dile Car Plant**—A new factory will be started in Reading, Pa., for the manufacture of the Dile car, a two-passenger runabout now in the course of construction by the Dile Motor Car Co., recently incorporated with a capital stock of \$20,000. The car will be made in the former Deppen brewery building, corner Tenth and Chestnut streets. The company will start operations with a small force of men, but by March 1 will begin work on a more extensive scale giving employment to over 150 employees. The entire four floors of the building will be used. The car will sell for \$450.

**Michigan Ore in Motor Cars**—The last report of the U. S. geological survey shows that Michigan made large increases in 1912 over 1911 in the production of the minerals that enter into motor car construction. It now ranks second only to Minnesota in the production of iron ore. In 1911 8,945,103 long tons, valued at \$28,810,710, were mined, while in 1912 the iron ore production increased to 12,717,468 long tons, worth \$29,003,163. Michigan stands next to Arizona and Montana in the output of copper. The 1912 production was 218,138,408 pounds, valued at \$135,992,837, a decrease in quantity but an increase in value of \$8,000,000 over the 1911 figures. The reports credit Michigan

with the production of 5,200,000,000 pounds of copper from 1810 up to the end of 1912, or about 30 per cent of the total output of the United States.

**Receiver for Sandusky Company**—Application will soon be made in the bankruptcy court at Sandusky, O., for the sale of the entire property of the Sandusky Auto Parts and Truck Co., a concern that employed 300 men before shutting down several months ago. The failure of the Michigan Buggy Company, it is said, forced the company to close.

**Start Work on New Engines**—The Augustine Rotary Valve Engine Co. of Marshfield, Wis., having received its letters patent on its new motor, is now engaged in the manufacture of several demonstration models in various sizes, preparatory to beginning a large production for the market. The models will be ready by April 1 and the field will then be canvassed.

**To Reopen Axle Plant**—By an order issued by Federal Judge Albert B. Anderson, of Indianapolis, and served by Commissioner T. J. Logan, of Fort Wayne, Joseph Doecker will open the plant of the Wayne Auto Axle Co., at Fort Wayne, Ind., and run the business. Jobs that were to be turned out when the company went into the hands of a receiver will be finished and shipped.

**A. C. A. Test Charges**—The Automobile Club of America announces motor tests such as the Packard and Moline underwent at the rate of \$100 a day when the test exceeds 200 hours. In view of this consideration the club provides everything in the nature of materials and help excepting gasoline and oil. This rate of \$100 per day includes the time required by the laboratory force and cost of setting up the motor for test. In shorter tests a rate of \$5 per hour, or \$144 per day is charged. This test is based on a consideration of \$3 per hour for the appliances and \$3 an hour for attendants.

**New Wheel Company Formed**—The Raymond Auto Wheel Co. has been formed in Massachusetts to produce a non-puncturable motor wheel at Ayer, Mass., in the factory of the Chandler Machine Co. The device was invented by Charles W. Howard of Concord. The wheels are now mounted on a Ford car which is being run for experimental purposes. The principal of the wheel is pneumatic and not spring, and it is claimed to be the only one of its kind in the world. Within the rim of the wheel, which is made of metal and hickory, are three pneumatic bearings, and the wheel itself has a solid rubber tire. John H. Trayne, president of the company, claims that there is a perfect distributing pressure, which gives the desired resiliency without a single chance of tire trouble.

**Employees Club House Opened**—The Republic Rubber Co.'s employees' club house at Youngstown, O., was formally opened January 15. During the day and evening thousands of persons visited the new building, many of the visitors coming from all sections of the country. The club house is for the company's employees and governed by them. Any employee upon payment of \$1 becomes a sustaining member and has the privilege of the entire building, and all employees, whether sustaining members or not, have the privileges of the main floors. Meals, lunches, hot coffee, etc., are served on a cost basis and employees can eat their lunches in the main dining room, which has a seating capacity for 1,200. Six fine bowling alleys have been installed and there are pool

tables, card tables, shower baths, etc. Adjoining the club house are baseball, football and tennis grounds. From time to time lectures and other entertainments will be given, the whole scheme being to make the club practical in every way.

**New Fuel Saving Solution on Market**—The Power Gas Products Co. has opened northwestern headquarters in the Plymouth building, Minneapolis, Minn. C. E. Wallerstedt, Swedish vice counsel, is president of the company which has a liquid that is advertised to add mileage to gasoline.

**Form Company to Make Tops**—H. W. Wiley, assistant manager for the Minneapolis motor show, has united with Charles L. Postal of Detroit, Mich., in the Wiley-Postal One Lady Top Co. to manufacture a new top for motor cars. The company considers the construction of a plant midway between the twin cities.

**Rubbernix Company Elects Officers**—At the annual meeting of the stock holders and directors of the Rubbernix Mfg. Co. of Toledo, O., the following officers were elected: E. A. McLain, president; G. R. Reiter, vice-president; Douglas McLain, secretary, and George Grasser, treasurer. The company makes tire filler and substitutes for rubber.

**Lease Site for Canadian Factory**—New York capitalists have leased a site adjoining the Ford Motor Co.'s property at Coldbrook, N. B., and announce that, as the Dominion Motor Car, Ltd., they will erect a motor car factory. The names mentioned are H. M. Rockefeller, J. H. Flagler and two directors of an American motor car factory, John A. Graham and Leslie F. Bond.

**Truck Maker Visits Western Agents**—James L. Geddes, president of the Kelly-Springfield Motor Truck Co., of Springfield, O., is making a trip of inspection through the western field, as a result of which the territory served by the Northwest branch in Seattle, has been enlarged to include the states of Washington, Oregon, Idaho and Montana and the province of British Columbia. Location of an assembling plant at Seattle is a possibility within the next 2 years, according to Mr. Geddes.

**Opens Nine New Service Stations**—The Elsemann Magneto Co. announces the opening of the following new service stations: Philadelphia Magneto Repair Co., Philadelphia, Pa.; H. G. Zimmerman, Harrisburg, Pa.; P. Melchoirs Machine Works, Omaha, Neb.; Archer-Wiggins Co., Portland, Ore.; Charles Rubel & Co., Washington, D. C.; Storage Battery Service Co., Seattle, Wash.; Bissingers Magneto Exchange, Cleveland, O.; McCarthy Bros. and Ford, Buffalo, N. Y., and Auto Supply Co., Memphis, Tenn.

**Drawback on Windshields Extended**—The regulations of the treasury department of October 4, 1911, providing for the payment of drawback on windshields manufactured by the Rands Mfg. Co., Detroit, with the use of imported plate glass, have been extended to provide for the payment of drawback on such windshields when exported as part of the equipment of motor cars. The new regulations provide that where the windshields are exported in connection with motor cars the notice of intent shall show, in addition to the usual data required, the name or designation of the motor car, the name of the manufacturer thereof, and that drawback is claimed on the windshield forming a part of the equipment of such motor car which was manufactured by the Rands Mfg. Co.





# Brief Business Announcements



## Recent Agencies Appointed by Motor Car Manufacturers

### COMMERCIAL CARS

Town	Agent	Make
Avoca, Ia.	Avoca Auto & Supply Co.	Oakland
Arkansas City, Kans.	J. E. Tutton	Moon
Auckland, N. Z.	Strong & Trowbridge	Moon
Albuquerque, N. M.	Albuquerque-Haynes Motor Sales Co.	Haynes
Ambler, Pa.	Ambler Garage	Haynes
Augusta, Me.	W. S. Ladd	Haynes
Armour, S. D.	Loeffler & Edwards	Haynes
Arkansas City, Kans.	J. E. Sutton	Moon
Buda, Ill.	Holmes & Anderson	Moon
Bloomfield, Neb.	H. A. Dahl	Haynes
Bryan, O.	Wetz & Wertz	Oakland
Bainbridge, Ga.	Caldwell Motor Car Co.	Haynes
Chico, Cal.	T. H. Morgan	Haynes
Cynthiana, Ky.	Cynthiana Carriage Co.	Haynes
Canal Winchester, O.	C. Coffman	Empire
Clinton, Ind.	Clinton Auto Co.	Haynes
Charlotte, N. C.	Haynes Distributing Co.	Haynes
Columbus, O.	P. H. Rogers Motor Car Co.	Haynes
Clarinda, Ia.	O. B. Holton & Son	Oakland
Cincinnati, O.	Robert C. Crowthers	Lexington
Cincinnati, O.	Robert C. Crowthers	Howard
Canyon, Tex.	J. A. Gruthrie & Co.	Moon
Delaware, O.	H. W. Lenox	Empire
Du Bois, Pa.	Johnston Garage	Haynes
Decorah, Ia.	Peter Johnson & Sons	Haynes
Edmonton, Can.	Fourteenth St. Garage Co.	Haynes
Edison, O.	C. W. Wells	Empire
Earling, Ia.	F. E. Willwerding	Oakland
Des Moines, Ia.	Means Auto Co.	Marathon
Dixon, Ky.	R. L. Jackson	Hudson
Frankfort, Ky.	Joseph Severance	Hudson
Franklin, Mass.	John Stobart	Oakland
Frederick, Md.	Chester Kemp	Haynes
Fulton, N. Y.	R. D. Piper	Haynes
Fl. Worth, Tex.	Detroit Electric & Motor Car Co.	Oakland
Greenville, N. C.	L. A. Randolph Co.	Haynes
Gravely, Ia.	C. S. Oswald	Oakland
Griswold, Ia.	George S. Schuler	Oakland
Huntsville, Ala.	O. M. Graham	Moon
Hammond, Ill.	E. B. Leavitt	Haynes
Haverhill, Mass.	Central Garage	Oakland
Hicksville, O.	Good & Kimbel	Oakland
Harvard, Ill.	Manley Hardware Co.	Haynes
Hickory, Pa.	Ross Motor Car Co.	Moon
Hartford, Conn.	Britton Co.	Oakland
Hartford, Conn.	W. N. Barrett	Metz
Henry, Ill.	J. E. Barry & Co.	Moon
Indianapolis, Ind.	H. L. Archey	Haynes
Iona, Minn.	C. Gehrsen	Haynes
Kittanning, Pa.	Moorhead Motor Car Co.	Moon
Kingsley, Ia.	O. S. Pixler	Oakland
La Crosse, Wis.	T. T. Bergh	Haynes
Lexington, Neb.	O. K. Jones	Oakland
Lawrence, Kans.	E. L. Charlton	Moon
Lexington, Mo.	E. F. Cox	Moon
Leetsdale, Pa.	F. H. Mohn	Moon
Linwood, Neb.	Stava & Franklin	Oakland
Lawrence, Kans.	E. L. Charlton	Moon
La Harpe, Ill.	J. F. Fox	Haynes
Leipsic, O.	Townsend's Garage	Saxon
Louisville, Ky.	Thomas Garage	Winton
Lexington, Mo.	F. F. Cox	Moon
Mt. Pleasant, Pa.	McCurdy Auto Co.	Haynes
Madison, Wis.	Knipprath Motor Car Co.	Haynes
Mason City, Ia.	J. Lyons	Haynes
Montreal, Can.	Meger & St. Pierre	Oakland
Montreal, Can.	Meger & St. Pierre	Partin-Palmer
Montreal, Can.	Meger & St. Pierre	Palmer Singer

Town	Agent	Make
Montreal, Can.	Weldon Motor Car Co.	Havers
Marsardis, Me.	E. J. Matthews	Oakland
Montreal, Can.	Gadbois Ltd.	Palmer Singer
Montreal, Can.	Gadbois Ltd.	Metz
Montreal, Can.	Gadbois Ltd.	Case
Monnessen, Pa.	Monnessen, Pa.	Moon
Martinsburg, W. Va.	Martinsburg Auto Co.	Haynes
McKeesport, Pa.	J. T. Mooney & Son	Moon
Mercer, Pa.	Mercer Auto Co.	Moon
Minneapolis, Minn.	C. & S. Co.	Motokart
Minneapolis, Minn.	Alex R. Curtis	Crow-Elkhart
Minneapolis, Minn.	Alex R. Curtis	Lewis
Minneapolis, Minn.	Fawkes Automobile Co.	Oldsmobile
Minneapolis, Minn.	H. S. Haynes Motor Car Co.	Monarch
Mobile, Ala.	A. W. Brooks	Moon
Newark, O.	American Machine Co.	Oakland
North Adams, Mass.	F. L. Rand Auto Co.	Oakland
Newark, O.	Murray Connelly	Empire
Newark, O.	S. E. Forsythe	Studebaker
New Orleans, La.	G. F. Spence	Haynes
Nashville, Tenn.	John H. Lawrence & Sons	Moon
Ottumwa, Ia.	Wapello Auto Co.	Haynes
Odell, Ill.	Cosgrove & Cleary	Moon
Olathe, Kans.	H. A. Case Auto Co.	Moon
Orleans, Neb.	Lindeen Hardware Co.	Oakland
Olathe, Kans.	H. H. Case	Moon
Owensboro, Ky.	Elmer Little	Hudson
Petersburg, Va.	Central Motor Car Co.	Haynes
Pittsfield, Mass.	Fred Smith	Oakland
Philadelphia, Pa.	Colonial Motor Co.	Partin-Palmer
Paulding, O.	Paulding Auto Co.	Oakland
Pittsburgh, Pa.	Klinger Co.	Ohio
Philadelphia, Pa.	Minerva Auto Co.	Moon
Paducah, Ky.	Kentucky Auto & Machine Co.	Hudson
Rheims, Pa.	Landis Brothers	Haynes
Reno, Nev.	J. E. Threlkel	Haynes
S. Brownsville, Pa.	Dr. A. C. Smith	Haynes
Springfield, Mass.	Springfield Automobile Co.	Haynes
Sioux Falls, S. D.	C. O. Armstrong	Haynes
St. Petersburg, Fla.	G. B. Haines	Haynes
San Luis Obispo, Cal.	California Garage	Haynes
Suncoke, N. H.	Hillman's Garage	Oakland
San Francisco, Cal.	Rene J. Marx	National
Springfield, O.	C. E. Jordan	Haynes
Sioux City, Ia.	Bennett Auto Co.	Moon
Seattle, Wash.	Independent Electric Garage	Rauch & Lang
San Francisco, Cal.	S. C. Chapman	Grant
San Francisco, Cal.	Rene J. Marx Co.	National
Tiffin, O.	C. C. Creeger	Hupmobile
Terre Haute, Ind.	Clinton Auto Co.	Haynes
Trenton, N. J.	Toman Brothers	Haynes
Toronto, Can.	S. J. Murphy	Haynes
Topeka, Kans.	Richmond Auto Co.	Moon
Toronto, Ont.	Progressive Tire Co.	Moon
Tiffin, O.	Summers & Miller	Saxon
Tacoma, Wash.	A. St. Garage	Saxon
Tacoma, Wash.	Cliffe Heath Machine Co.	Metz
Vermillion, S. D.	Thompson-Lewis Co.	Haynes
Vande Grift, Pa.	Whitacre & McCullough	Moon
Wheeling, W. Va.	Tri-State Motor Car Co.	Hudson
Winnipeg, Can.	Franklin Motor Car Co.	Franklin
Watertown, N. Y.	J. M. Weeks	Haynes
Wichita, Kans.	H. W. Schroeter	Moon
Wichita, Kans.	Richmond Auto Co.	Moon
Waneta, Neb.	C. E. Johnson	Oakland
Williamantic, Conn.	F. L. Powell	Oakland
Wichita, Kans.	H. W. Schroeder	Moon

### PASSENGER CARS

Kansas City, Kans.	Skellert Co.	Kelley
Minneapolis, Minn.	Capital Storage Co.	Indiana

Ottawa, Can.	Rode Brothers	Monitor
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**ABBOTSFORD, Wis.**—The Wells and Chase Automobile Co. is building a large storage house for handling its car stocks and the overflow of its present garage.

**Anderson, S. C.**—W. E. Watson has opened a new garage in Anderson and is selling accessories and doing a general repair business under the name of the Piedmont Garage Co. A car agency will be taken later.

**San Francisco, Cal.**—The John F. McLain Co., which recently took over the local branch of the Franklin Automobile Co., has been incorporated. Gus A. Boyer has become associated with the corporation and will become vice-president and sales manager. Boyer was president and general manager of the Pope-Hartford California Co. and while he will retain his interest in the latter concern pending its disincorporation, he will devote all his energy to the sale of the Franklin line. Boyer was formerly agent for the Franklin car in this district and had all

his dealings with the factory through McLain who was then coast factory man for the Franklin company.

**Minneapolis, Minn.**—The Oldsmobile company has leased its headquarters building at 1635 Hennepine avenue to the Firestone Tire and Rubber Co. Manager J. T. Fisher has transferred his flag to the building of the Fawkes Automobile Co., which has taken over the complete line of parts, supplies, and other accessories and will represent the Oldsmobile company here.

**San Francisco, Cal.**—The Western Cycle Car Co., a San Francisco corporation, has secured the California distributing rights of the Imp cyclecar, having closed a contract with the Imp maker for 2,500 cyclecars for distribution in California for the coming year. The Western Cycle Car Co. is headed by Carl Christensen of the Carl Christensen Motor Co., distributor of the Detroit car in northern California, who will carry on the

cyclecar business independent of the motor car distribution. New quarters are to be secured for the cyclecar and a branch is to be established in Los Angeles.

**Milwaukee, Wis.**—The agency for the Stanley steam car in Wisconsin, until now operated as the J. C. Cox Automobile Co., has been changed to a corporation styled the Stanley Steamer Co. The concern has a garage and salesrooms at Fourth and Prairie streets, Milwaukee, in charge of W. W. Burgette.

**Hartford, Conn.**—L. W. Martin of New York, a man who has been associated with the Times Square Automobile Co. of New York, has opened a clearing house for used cars on Franklin avenue. This location, somewhat remote from the business center of the city, provides for the accommodation of 200 cars. Martin has interviewed all the local dealers and plans to do business on a 10 per cent commission basis.



# AT THE CHICAGO SHOW

More cars will be  
equipped with . . .

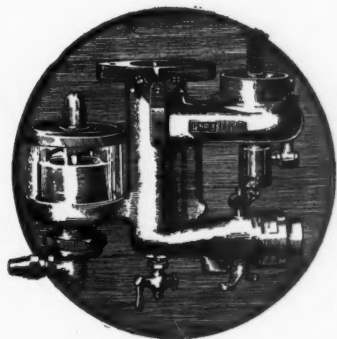
**STROMBERG**  
CARBURETORS

*"The Accepted Standard"*

than with any other  
make of carburetor

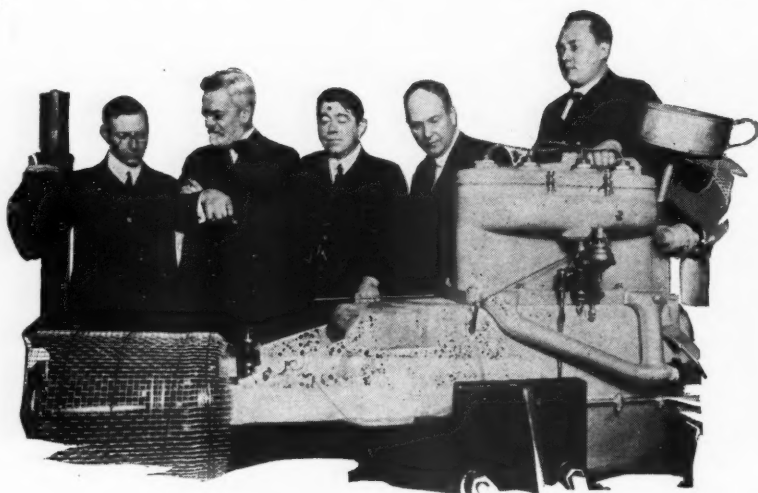
We will show and tell  
you why at our booth  
Coliseum Gallery—  
. . . Spaces 35-36

Don't fail to see the  
New Model Stromberg  
Carburetor that created  
such a sensation at the  
New York Show . .



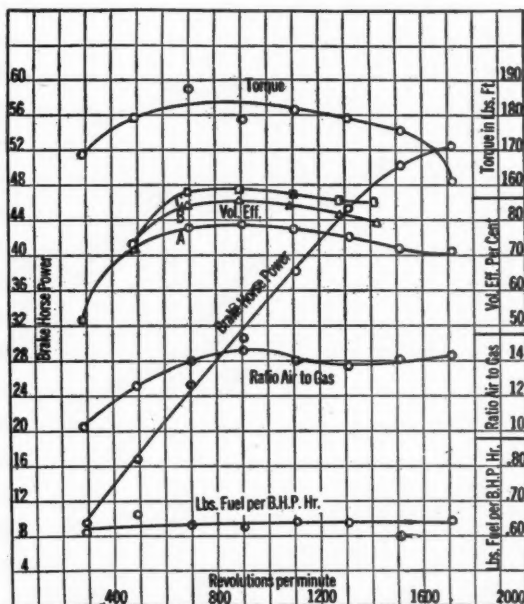


# The Schebler Carburetor



officially breaks  
all world's records  
for power, econ-  
omy, flexibility  
and endurance.  
Completing the  
337-hour test of

## Moline-Knight Motor



in laboratory of the Automobile  
Club of America, without change  
of adjustment.

The most perfect performance  
of a carburetor officially recorded  
in gas engine history.

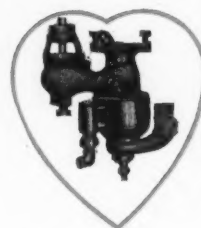
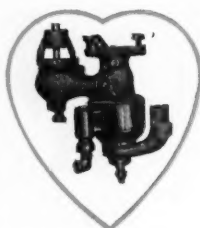
The carburetor was a Model R  
Schebler, standard stock equip-  
ment of the Moline-Knight Motor.

## WHEELER & SCHEBLER, Indianapolis, Ind.

*"Pioneers in Perfection of Carburetion"*

### BRANCHES:

Fry & McGill Motor Supply Co. ....	Pennsylvania Rubber & Sup. Co. Cleveland
Automobile Accessories Co. Pittsburgh, Pa.	Wheeler & Schebler .....
Ferris-Dunlap Auto Supply Co. ....	Wheeler & Schebler .....
..... Dallas, Tex.	Fred Campbell .....
Interstate Electric Co. New Orleans, La.	W. J. Connel .....
Reinhard Bros. Co. Minneapolis, Minn.	..... Boston, Mass.
Manufacturers' Supply Co. ....	Equipment Co. ....
..... Philadelphia, Pa.	..... Kansas City, Mo.
Weinstock-Nichols Co. Los Angeles, Cal.	Elyea-Austell Co. ....
	..... Atlanta, Ga.
	J. C. Nichols .....
	..... New York City
	Weinstock-Nichols .....
	..... San Francisco
Fairbanks, Morse & Co., Ltd., London, England	
Canadian Fairbanks-Morse Co. (All principal Canadian Cities)	





JUDGE CHATFIELD  
of the U.S. District Court

in his  
decision  
upholding  
the validity  
of the  
Klaxon  
Basic  
Patents  
and  
declaring  
the "Newtone"  
horn to be  
an infringement  
—explains  
the tone  
qualities  
that make the  
Klaxon note  
a true  
WARNING

"WHEN further away the tone of the alarm is more musical but of sufficient volume and penetration to attract the notice in spite of other noises and general air vibrations."

"As the signaling object approaches or as the sound comes from a lesser distance, its harsher, less melodious, more unpleasant and more compulsory qualities increase until, when close at hand, the unpleasant and disturbing elements of the sound overwhelm any musical or tone producing sensation to the hearer."

"The sound has the further quality of indicating the direction of its source."

.....

"These signals . . . . . have a tendency to control physical movement on the part of the person signaled so quickly and so abruptly as to give greater protection than would be furnished by a more musical, pleasant or gradual obtrusion upon the sensory faculties of the person to be warned."

.....

"It is evident that any sound might be used and in a sense be available as a signal."

"Certain sounds, principally because of their musical qualities, are of little use as WARNING signals, if the warning is to be conveyed by the sound and not by a process of reasoning after the sound has drawn attention and observation."

"The warning signal, too, must be loud and possess the other qualities discussed earlier in the opinion."

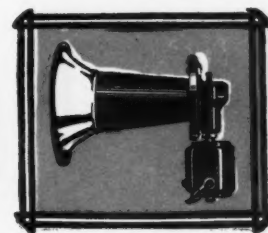


KLAXONET

Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

**KLAXON**

*"The Public Safety Signal"*



KLAXON

Type Composition of this advertisement done in the Klaxon Factory with "Klaxon" type especially designed by F. W. Goudy



# Oldsmobile

## 1914



There are, of course, buyers of motor cars who choose the Oldsmobile because there is a certain distinction about this famous car that appeals to their sense of pride.

But we ask no man to select the Oldsmobile on that account. On the contrary, we take peculiar pleasure in going over this splendid motor car in the minutest detail with the purchaser, and showing him that the superiority of the Oldsmobile rests—not on an airy tradition of intangible prestige—but on actual, demonstrable value, such as few organizations in this country can or do put into their product.

This year, when more than ever before, motor cars are being bought on merit alone, the Oldsmobile is recognized as a car that will stand the test of most rigid scrutiny. Well has it been proclaimed—"The greatest six cylinder car ever produced."

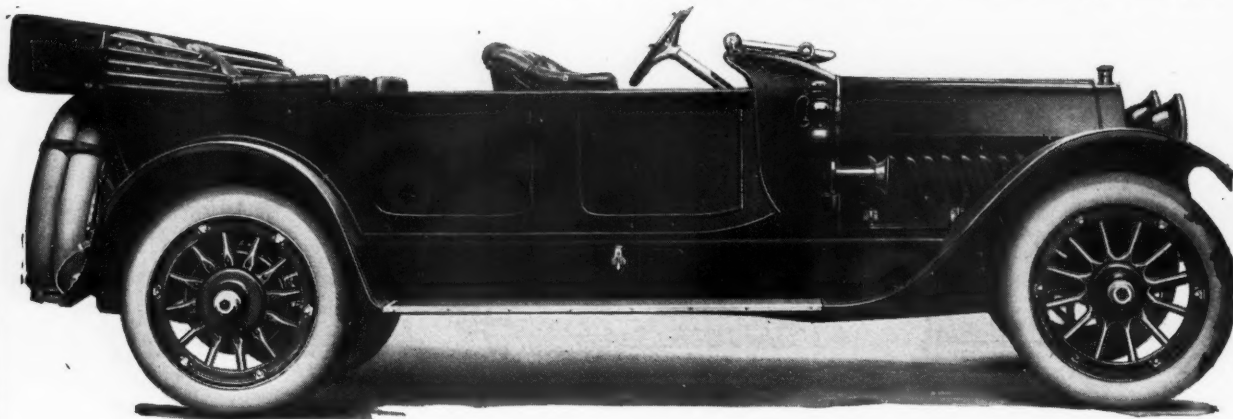
### The Opportunity for the Dealer

1914 buying is about ready to begin in real earnest, and the dealer who can offer the Oldsmobile to his customers will do an easy and profitable business.

This is the best Oldsmobile that has ever been built; yet the price has been lowered to a point that is but little more than the figure asked for cheaper makes of cars. Our increased production allows us to offer some very desirable territory to dealers who are prepared to properly represent us.

Combination 4 or 5 Pass. Phaeton, Touring Body Type, \$2975.  
Seven Pass. Touring Body, \$175 Extra. Limousine, \$4300.

**Olds Motor Works, Lansing, Mich.**





# 78 PER CENT

of all [the electrically equipped gasoline cars exhibited at the New York Show, contained



TRADE MARK REGISTERED

## STORAGE BATTERIES

See Page 133 of The Automobile of January 8, 1914, for details of Electric Lighting and Starting Equipment and note the Battery column.

**WILLARD STORAGE BATTERY CO., Cleveland, Ohio**

New York Branch: 136 W. 52nd St.  
Detroit Branch: 1191 Woodward Ave.

Chicago Branch: 2241 Michigan Ave.  
San Francisco Branch: 243 Monadnock Bldg.

Indianapolis Branch: 438 and 439 Indiana Pythian Bldg.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO.

(85)

*When Writing to Advertisers, Please Mention Motor Age.*



# The Car That Broke All Records for ECONOMY

# Buick

## Six

**Another triumph for the Buick Overhead Valve Motor—The six-cylinder Buick was driven 20.1 miles on a gallon of gasoline, carrying four passengers without once releasing the clutch.**

This test was made in Chicago under the supervision of **F. E. Edwards**, formerly technical expert for the American Automobile Association, assisted by **Mr. Darwin Hatch**, technical expert of the Chicago Motor Club and Motor Age, and Automobile Editors **Reed Parker** of the Chicago Tribune, **Ed. Westlake** of the Chicago Evening Post, **F. L. Estey** of the Chicago Examiner, **St. Claire Couzens** of the Chicago Journal, and **A. W. Stryker** of the Chicago American.

Signed statements are shown on opposite page, their stories in the Chicago daily papers speak for themselves.

This test, made under the supervision and in the presence of men of authority and standing in the automobile world justifies beyond question our Guarantee that the Buick Six with five passengers will tour over ordinary roads consuming not more than one gallon of gasoline for every fifteen miles traveled.

What more can you ask of any car than the Buick offers—**Greatest Economy Guaranteed—Greatest Power Guaranteed—Riding Comfort—Beauty of Line and Finish.**

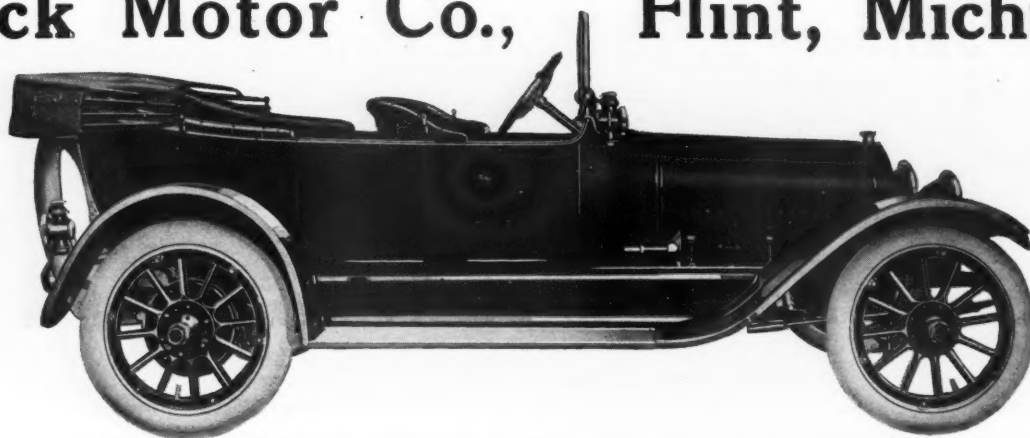
### Buick Overhead Valve Motors in All Buick Models

This same guaranteed motor is in all three models—from the small runabout to the big "Six." All models without extra cost are equipped with Delco self-starting and lighting system, left-hand drive and center control. Three chassis and six body styles, from \$950 to \$1985.

### The Test

A careful, technical inspection was made under the supervision of Experts Edwards and Hatch. One gallon of gasoline was accurately measured into the tank. The gasoline was rated at 62 Baume in a temperature of 55 degrees. Expert Hatch sat with the driver to see that the clutch was not released during the trip and making sure that ordinary driving conditions were observed. After the start the temperature dropped to freezing. Snow and sleet began to fall and the roadways became sheeted with ice. The wind blew at the rate of 23 miles an hour, and for fully half the distance directly against the car. At the end of the test the speedometer registered 20 1/10 miles. This instrument was verified by the Warner Speedometer Company, and the verification is reproduced on the opposite page.

## Buick Motor Co., Flint, Michigan



*When Writing to Advertisers, Please Mention Motor Age.*



# Newspaper Men and Experts Witness World's Economy Record

CHICAGO DAILY JOURNAL, January 17th

## BUICK MAKES 20 MILES ON ONE GALLON OF GAS

Tests Made at Factory at Flint, Mich., Are Confirmed Here

By ST. CLAIR COUZENS.

In service in various cities where the par-

CHICAGO EXAMINER,  
January 18th

## WARNER NOT SURPRISED AT BUICK VICTORY

Official Test of Six-Cylinder Car Shows 20 and One-Tenth Miles on Gallon.

## WEATHER PROVES HANDICAP

Auto, Weighing 4,550 Pounds Makes Run With 4 Passengers and Regular Equipment

BY F. L. ESTEY.

CHICAGO DAILY TRIBUNE,  
January 16th

## BUICK LIGHT FOUR MACHINE GOES 22.7 MILES ON GALLON.

Car Given Semi-Official Fuel Economy Test Over South Park Boulevards—Six Cylinder Shows 20.1.

BY REED L. PARKER.

## Economy Test of Model B-55 Six Cylinder Buick

Motor, six cylinder, 3 $\frac{1}{2}$ x5. Model No. 130. Chassis No. 122. Carburetor, Marvel, Model E-3, No. 52319. Ignition, Delco. Speedometer, Warner, No. 392291. Weight of car with four people at end of the test 4550 lbs. Driver of the car, Eddy Lien; observer on car, Darwin Hatch. Distance run on one gallon of gasoline as per speedometer reading, 20.1 miles. Note: This speedometer and odometer was tested and checked by the Stewart-Warner Speedometer Corporation immediately after the conclusion of the test.

Note: The upper third of the windshield was lowered on this car during the run.

(sgd) Reed L. Parker,  
(sgd) Darwin S. Hatch,  
(sgd) F. E. Edwards.

Subscribed and sworn to before me this 15th day of January, 1914.  
(SEAL) (sgd) C. R. O'Neill,  
Notary Public.

Chicago, January 15th, 1914.  
Buick Motor Company, Chicago Branch, Chicago, Illinois.

Gentlemen: We hereby certify that we were present during the one gallon gasoline economy test of the Buick 6-cylinder and Buick 4-cylinder cars on January 14, 1914, and that the reports of the technical committee are correct and in accordance with all the conditions demanded by the American Automobile Association in contests of this kind.

Yours very truly,  
(sgd) E. G. Westlake,  
Automobile Editor The Chicago Evening Post.  
(sgd) A. W. Stryker,  
Automobile Editor Chicago American.  
(sgd) St. Clair Couzens,  
Chicago Daily Journal.

Chicago, Ill., Jan. 14, 1914.  
To Whom It May Concern: This is to certify that Instrument No. 392291 has this day been tested and found to be absolutely correct on both odometers trip and season. The gearing being the correct ratio for 36" tire.

Very truly yours,  
Stewart-Warner Speedometer Cor'n,  
Michigan Ave. Branch,  
Per (sgd) H. B. Snodgrass.

**Buick Motor Co.**  
Flint, Mich.

**When Better Automobiles are Built Buick Will Build Them**

When Writing to Advertisers, Please Mention Motor Age.

THE INTER-OCEAN,  
January 18th, Chicago.

## BUICK "SIX" IN TEST SETS FUEL RECORD

Car Loaded to Capacity Is Driven Over Icy Roads Distance of 20.1 Miles on One Gallon of Gasoline.

## MARKS ALSO SET BY FOURS

Performance Made Under Supervision of F. E. Edwards Substantiates Statements Made by Factory.

CHICAGO EVENING POST,  
January 15th

## BUICK SIX IN TEST SETS ECONOMY RECORD

Driven Over Icy Roads Car Makes 20.1 Miles on One Gallon of Gasoline

## FOURS ALSO SET MARKS

BY E. G. WESTLAKE

THE DAILY NEWS, CHICAGO  
January 15th

## WINS IN THE EASTERN TRIALS

Fuel Economy Tests Set in East Eclipsed at Chicago Yesterday.

Buick cars, in addition to being the only perfect score cars in the December reliability of the New York dealers also carried off the honors for fuel economy in the 500 mile run over Long Island and Connecticut roads. The gasoline records made in this eastern event, however, were eclipsed yesterday afternoon here in Chicago in a semi-official way, the feature of the test being the wonderful performance of the six cylinder Buick which succeeded in running 20.1 miles on a single gallon of gasoline, considered remarkable because of its many cylindered motor.



# Show the Public the Truth

## \$10,000 for Facts!

**A** KNIGHT sleeve valve motor, the second engine produced by the Moline Automobile Company, and made wholly by American workmen of American materials, has just undergone a brake test of 337 hours in the laboratory of the Automobile Club of America, the severity of which was never before thought of for a high-speed internal combustion engine.

The test was made in the identical laboratory, with the same apparatus and experts, as the 300 hour test of a poppet-valve motor manufactured and entered last May by one of the largest, oldest and best known manufacturers of automobiles in the United States.

The superiority of the Knight motor over the poppet-valve, under exact conditions, was shown by these tests to be so overwhelming that the subject does not even require discussion. Even the most biased poppet-valve maker would not question the matter.

Now, either **this** motor which set the standard for the poppet-valve was woefully inefficient, or the Knight sleeve valve motor is 50 percent better than the best poppet.

If other manufacturers of poppet-valve motors entertain the idea that the particular engine of the poppet-valve type tested was **not** representative of the system, it is up to them to prepare a specimen which **will** equal the record of the Moline Knight and vindicate the poppet.

The Moline Automobile Company has issued a challenge to the world and deposited with the Broadway Trust Company, of New York, a certified check for \$10,000 to cover a similar amount to be put up by any manufacturer of poppet-valve cars who thinks one of his motors can equal this performance. The Moline Automobile Company also offers \$1,000 reward to any person who will induce any manufacturer of cars using poppet-valve motors to accept the challenge.

The Knight and Kilbourne Patents Company, owner of the Knight sleeve valve patents, will go a step further and present to the person who will secure such acceptor the latest type of car produced by the concern which covers the \$10,000 stakes and places its motor in the Laboratory of the A. C. A. for such 337 hour test, and secures certified results as meritorious as the performance of the sleeve valve motor.



## To Win This Car and the \$1,000 for the Finder of the Taker and the \$10,000 for the Maker of the Car

The poppet-valve engine must run continuously without a stop of any kind whatever for two weeks (336 hours), developing the same proportion of power for volume and piston speed, *as did the Moline-Knight.*

It must have no adjustment of carbureter, magneto, spark-plug or anything else upon which the power of the motor depends, *the record of the Moline-Knight.*

It must be capable at the end of 336 hours of showing greater power than at the beginning of the test without touching the carbureter or moving the throttle, *the record of the Moline-Knight.*

It must be capable, by simply advancing the magneto and without being stopped or otherwise adjusted, of speeding up to 1,700 revs. per minute and developing for one hour more than double the power of its S. A. E. rating at 1,000 feet piston speed per minute, *the record of the Moline-Knight.*

It must not consume more lubricating oil or gasoline per h. p. than the Moline-Knight.

It must obtain a certificate of the fact that the motor is no more noisy at the finish than at the start, *the record of the Moline-Knight.*

And last but not least,

It must come through this gruelling test in as good condition as it started, free from carbon; its wearing parts and bearing surfaces "in excellent condition," "without perceptible wear," *the record of the Moline-Knight in the recent test, and the record of the Daimler-Knight in a similar 132 hour test in England in 1909.*

If this challenge remains unaccepted, the natural conclusion is that *the poppet-valve is not capable of measuring up to the standard of perfection.*

Upon the pages following are printed fac-similes of the Official Certificate granted the Moline Company by the Technical Committee of the A. C. A. for this wonderful performance of its Knight motor. Note the comment of the committee, and how many times they allude to the "excellent condition" of the parts after this gruelling test. Then ask your poppet-valve friend why, if his motor will do this, he does not submit it to a similar ordeal and win \$10,000 cash for himself, \$1,000 cash for **you** and secure for you a present from the Knight and Kilbourne Patents Company one of his latest type cars.

(Continued on the following ten pages)



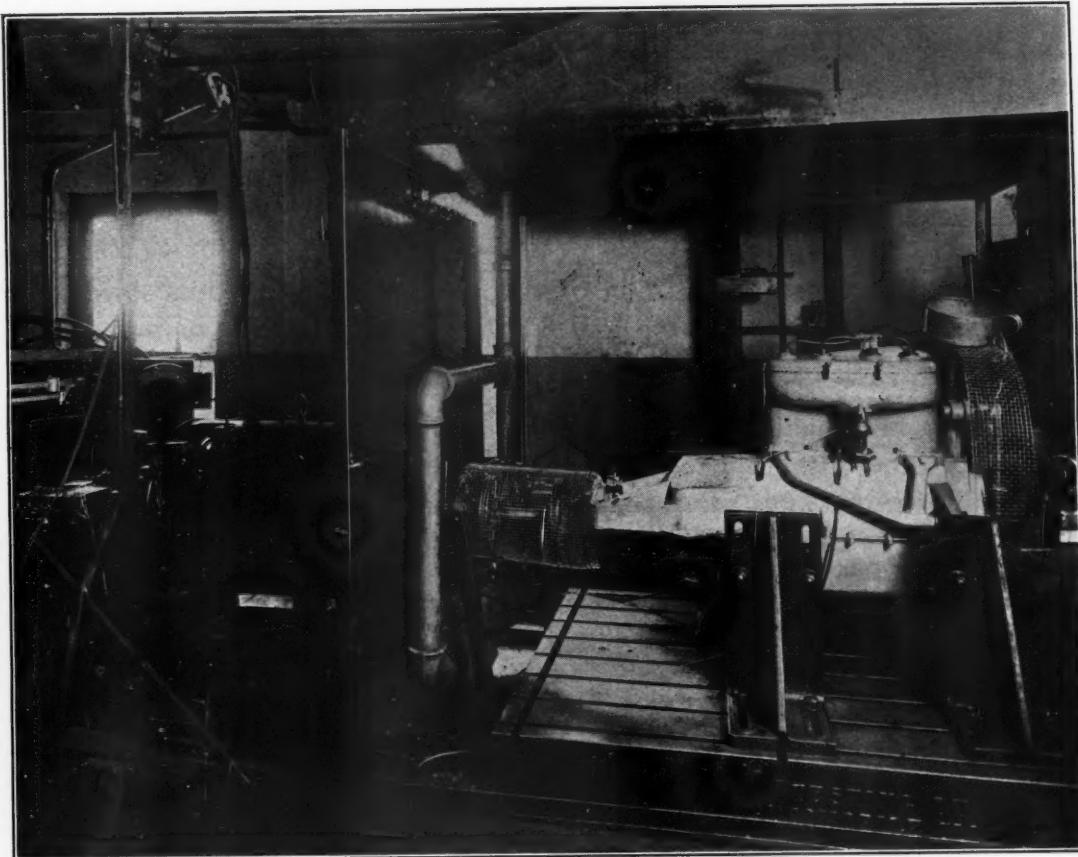
Test No. 12  
(10 pages) Page 1

December, 1913

BULLETIN OF THE A. C. A. TESTING LABORATORY

OFFICIAL REPORT ON 337-HOUR ENDURANCE TEST  
OF FOUR CYLINDER MOLINE-KNIGHT MOTOR

(Certified Test No. 12)



THE DYNAMOMETER FOR MEASURING THE POWER DEVELOPED.

THE MOLINE-KNIGHT MOTOR READY FOR THE TEST.

This is to certify that the Technical Committee of The Automobile Club of America has tested the Moline-Knight motor, manufactured by the Moline Automobile Company, with the following results:

ENDURANCE RUN.

**POWER.**—The motor ran without any stop whatever for 336 hours with wide open throttle and set spark at an average speed of 1,117 revolutions per minute. During this period the average brake load at one foot radius was 180 pounds, giving a resultant average brake horsepower of 38.3. The lowest horsepower reading for any fifteen minute interval during the entire 336 hours was 36.4. At the end of this period, without stopping motor, the speed was increased, and the motor developed an average of 53.0

brake horsepower for a period of one hour, while averaging 1,678 revolutions per minute. The variations in power plotted by half hour intervals for the entire run are shown graphically in Chart No. 1A. Averages for five hour intervals are given in Table No. 1.

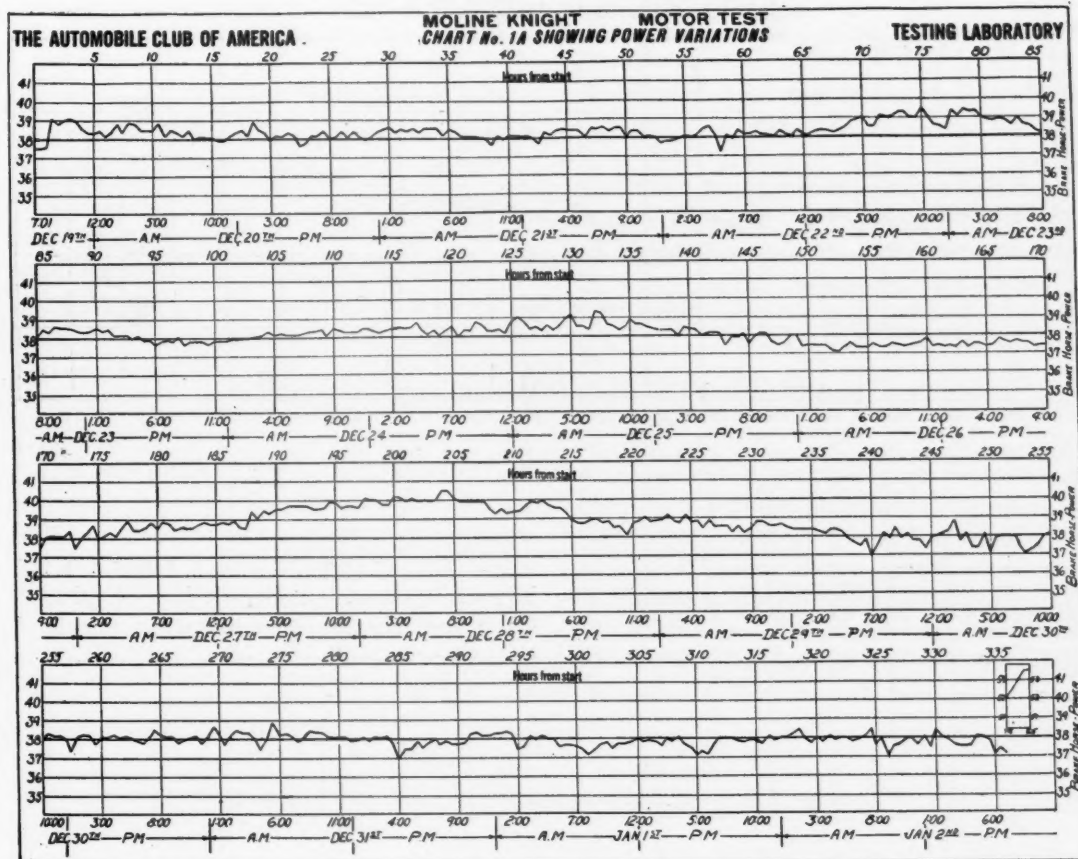
**FUEL.**—The total fuel supplied during the run of 336 hours was 10,645 pounds, or 1,744 gallons. It was found at the end of the endurance test, however, that a small hole had been worn through the fuel supply pipe at a point where the latter chafed, due to vibration, against a joint on the crank case. The leakage of fuel from this hole was not discovered because of the rapid evaporation brought about by the blast of air used to cool the crank case. By observation of the fuel curve given in Chart No. 1B,



December, 1913

Test No. 12  
(10 pages) Page 2

## BULLETIN OF THE A. C. A. TESTING LABORATORY



it is evident that the rate of fuel consumption gradually decreased for the first 160 hours, and thereafter increased to the end of the test, indicating that the leakage started at or about the 160th hour, and gradually became greater thereafter. The average consumption per hour for the first 160 hours was 31.5 pounds. For the last ten hours of this 160 hours interval it was 30.8 pounds per hour. The actual consumption for the remaining 177 hours of the test is questionable because of fuel leakage.

The gasoline used was taken from the same supply regularly delivered for use in the Club's garage, and gave an average Beaumé reading of 61.6° at 60°F. equivalent to 0.733 specific gravity.

**OIL.**—The total quantity of oil put into the motor during 337 hours running in the endurance test was taken from thirty-four sealed five-gallon cans, giving a total supply of 170 gallons. A total of seven quarts were taken from the motor during and following the test, leaving a net supply of 168.25 gallons. Throughout the

test oil was overflowing from the flywheel bearing. In fifteen minute runs prior to and following the endurance test, the average overflow was found to be about 0.87 pints per hour. Assuming that the average rate of loss throughout the endurance test was the same as the average loss in the short runs before and after, the total loss in 337 hours would be 36.6 gallons, leaving a net total consumption of 131.6 gallons (967 pounds), or 0.39 gallons per hour.

The oil used was supplied by F. H. Floyd of Detroit, who states that it was compounded from Russian and domestic stock.

#### ATMOSPHERIC CONDITIONS.

There was a wide variation in atmospheric conditions during the test, the temperature of the air blowing on the motor varying from 37° F. to 71° F., with an average of 57° F., while the barometer varied from 28.95 inches to 30.19 inches of mercury, with an average of 29.83 inches. It was noted that the power of the motor increased and decreased as the barometer rose and fell.



Test No. 12  
(10 pages) Page 3

December, 1913

# BULLETIN OF THE A. C. A. TESTING LABORATORY

## FUEL VARIATIONS IN ENDURANCE TEST

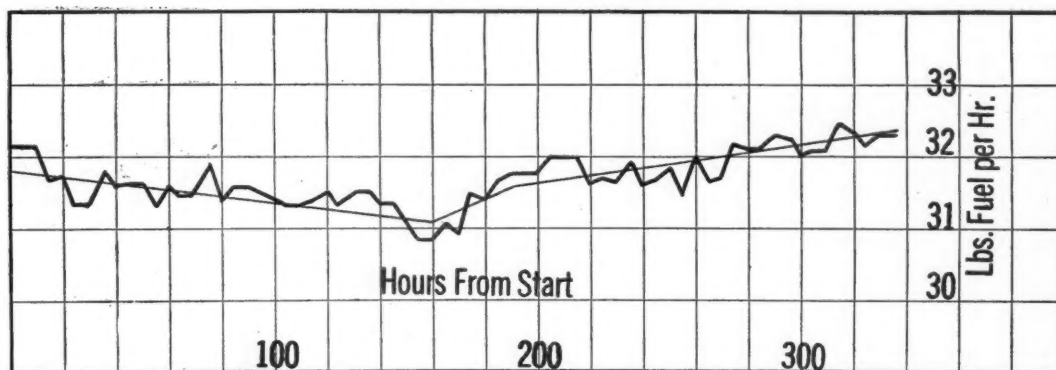


CHART NO. 1B.

ADJUSTMENTS.—The only adjustments made on the motor during the endurance run had to do with the fan and its driving belt. At the 131st hour the fan stopped, due to heating from slipping belt and gummy oil. The fan was removed, bearing cleaned and fan and belt replaced. At the 179th hour, belt was so loose that it hit the fan blades and jumped off. In applying a new belt

the thin outer rim of the V-pulley was broken and the belt was removed. The fan (which is one piece with pulley) was removed at 182nd hour. During the 326th hour a new fan and belt were put on, but the belt jumped off after about ten minutes running, and was not replaced until after the endurance run.

TABLE NO. 1.—ENDURANCE TEST.

Average Power and Fuel Consumption by Five-Hour Intervals.

Average.						Average.						Average.					
		Per		Gasoline				Per		Gasoline				Per		Gasoline	
		B. H. P. Hr.		B. H. P. Hr.				B. H. P. Hr.		B. H. P. Hr.				B. H. P. Hr.		B. H. P. Hr.	
From	To	R. P. M.	B. H. P.	Lbs.	Gals.	From	To	R. P. M.	B. H. P.	Lbs.	Gals.	From	To	R. P. M.	B. H. P.	Lbs.	Gals.
0	5	1127	38.5	.83	.136	111	115	1113	38.4	.82	.134	221	225	1114	38.9	.81	.133
6	10	1119	38.5	.83	.136	116	120	1116	38.4	.82	.134	226	230	1109	38.5	.82	.134
11	15	1114	38.3	.83	.136	121	125	1115	38.4	.82	.134	231	235	1114	38.5	.83	.136
16	20	1116	38.2	.83	.136	126	130	1121	38.7	.81	.133	236	240	1108	37.9	.83	.136
21	25	1117	38.1	.83	.136	131	135	1122	38.7	.81	.133	241	245	1112	37.8	.84	.137
26	30	1114	38.2	.83	.136	136	140	1118	38.4	.82	.134	246	250	1114	37.9	.84	.137
31	35	1124	38.4	.83	.136	141	145	1116	38.0	.82	.134	251	255	1111	37.7	.83	.136
36	40	1117	38.0	.83	.136	146	150	1120	37.8	.82	.134	256	260	1115	38.0	.84	.137
41	45	1122	38.2	.83	.136	151	155	1122	37.4	.82	.134	261	265	1114	38.1	.83	.136
46	50	1122	38.4	.83	.136	156	160	1123	37.5	.82	.134	266	270	1116	38.1	.84	.137
51	55	1113	38.0	.82	.134	161	165	1116	37.4	.83*	.136*	271	275	1123	38.2	.84	.137
56	60	1117	38.1	.83	.136	166	170	1112	37.6	.82	.134	276	280	1121	38.2	.84	.137
61	65	1118	38.1	.83	.136	171	175	1115	38.1	.83	.136	281	285	1122	37.9	.85	.139
66	70	1114	38.5	.82	.134	176	180	1118	38.5	.82	.134	286	290	1122	37.7	.86	.141
71	75	1119	39.0	.82	.134	181	185	1113	38.6	.82	.134	291	295	1121	38.2	.85	.139
76	80	1112	39.0	.81	.133	186	190	1114	39.1	.81	.133	296	300	1118	37.9	.84	.137
81	85	1110	38.6	.82	.134	191	195	1114	39.6	.80	.131	301	305	1115	37.6	.85	.139
86	90	1110	38.5	.82	.134	196	200	1114	39.8	.80	.131	306	310	1120	37.7	.85	.139
91	95	1113	38.1	.83	.136	201	205	1120	40.1	.80	.131	311	315	1116	37.8	.86	.141
96	100	1112	37.8	.83	.136	206	210	1118	39.6	.81	.133	316	320	1118	38.0	.85	.139
101	105	1108	38.0	.82	.134	211	215	1124	39.6	.81	.133	321	325	1116	38.0	.85	.139
106	110	1109	38.3	.82	.134	216	220	1107	38.6	.82	.134	326	330	1120	37.8	.86	.141
												331	336	1120	37.6	.86	.141
												Power and Fuel During 337th Hour					
												336	337	1678	53.0	.80	.131

\* NOTE—Leak in gasoline pipe probably started at this point. Fuel readings thereafter are probably in error—i. e., too high. See Text and Chart No. 1B.



December, 1913

Test No. 12  
(10 pages) Page 4

## BULLETIN OF THE A. C. A. TESTING LABORATORY

## SHORT RUNS.

Prior to and following the endurance run, a series of short runs were made,—with wide open throttle and spark set for maximum power—to determine the power, friction and fuel consumption of the motor at various speeds. The same carburetor setting employed during the endurance run was used in these runs. The maximum brake horsepower shown in these tests was 53.6 at 1,682 revolutions per minute. The results of these runs are given in Table No. 2, and Chart No. 2.

**SPECIAL FUEL EFFICIENCY TEST.**—In order to demonstrate the ability of the motor to run with a lower fuel consumption than that shown in the endurance run, and other runs mentioned above, the carburetor was readjusted, and the motor thereafter subjected to a five-hour run at an average speed of 1,114 revolutions per minute, and a series of short runs at different speeds. The average brake horsepower for the five-hour run was 39.7, and the average fuel consumption 0.63 pounds (equivalent to 0.103 gallons) per brake horsepower hour. For complete data of these runs see Table No. 3, and the corresponding chart (No. 3).

TABLE NO. 2.

## HORSEPOWER AND FRICTION AT VARIOUS SPEEDS.

Run.	Duration Mins.	R. P. M.	Torque Pounds Feet.	Brake H. P.	B. H. P. Plus Fr. H. P.	Gasoline per B. H. P. Hr.		Temperature Jacket Water.		Range.
						Lbs.	Gals.	In, F.°	Out, F.°	
Before Endurance Run. Barometer 29.85 Ins. (Fan Belt On.)										
A	5	294	184.3	10.3	....	.73	.120	79	133	54
B	5	499	183.8	17.5	19.9	.77	.126	79	147	68
C	5	704	186.4	24.1	28.9	.79	.130	85	160	75
D	5	888	179.5	30.4	36.9	.81	.133	85	157	72
E	5	1103	180.0	37.8	46.9	.85	.140	76	157	81
F	5	1284	175.5	42.9	44.3	.83	.136	77	162	85
G	5	1480	171.5	48.4	....	.81	.133	80	165	85
H	5	1693	161.2	52.0	....	.80	.131	82	171	89
After Endurance Run. Barometer 29.91 Ins. (Fan Belt Off.)										
A1	7	1682	167.5	53.6	....	Leaky	....	66	164	98
B1	5	1488	172.7	49.0	....	Gasoline	....	65	157	92
C1	5	1307	184.3	45.8	57.2	Pipe.	....	69	160	91
D1	5	1104	190.6	40.1	48.8	No	....	80	160	80
E1	5	909	190.6	33.0	39.2	Correct	....	81	160	79
F1	5	682	188.0	24.4	28.5	Fuel	....	85	160	75
G1	5	486	170.6	15.8	18.3	Readings	....	89	160	71
H1	5	292	176.9	9.8	....	Obtained.	....	93	160	67

Spark set for maximum power at each speed.

## FRICTION HORSEPOWER.

Before Endurance Run.					After Endurance Run.				
Run.	Duration Mins.	R. P. M.	Torque Pounds Feet.	Fr. H. P.	Run.	Duration Mins.	R. P. M.	Torque Pounds Feet.	Fr. H. P.
J	2	468	26.3	2.3	J1	2	489	27.8	2.6
K	2	673	34.7	4.4	K1	2	697	34.7	4.6
L	2	865	39.4	6.5	L1	2	888	37.8	6.4
M	2.5	1113	47.2	10.0	M1	2	1097	44.1	9.2
N	2	1267	47.2	11.4	N1	2	1310	45.6	11.4
O	3	1371	46.7	12.2	O1	2	1416	46.2	12.5
P	2	1098	43.6	9.1	P1	2	1106	41.5	8.7
Q	3	676	32.0	4.1	Q1	2	903	36.2	6.2
					R1	2	697	31.5	4.2
					S1	2	487	27.3	2.5

Mean temp. of jacket water 104° F.

Mean temp. of jacket water 97° F.



Test No. 12  
(10 pages) Page 5

December, 1913

# BULLETIN OF THE A. C. A. TESTING LABORATORY

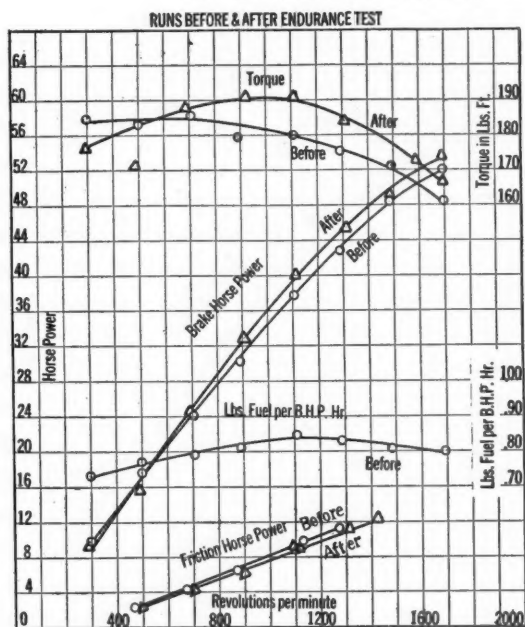


CHART No. 2.

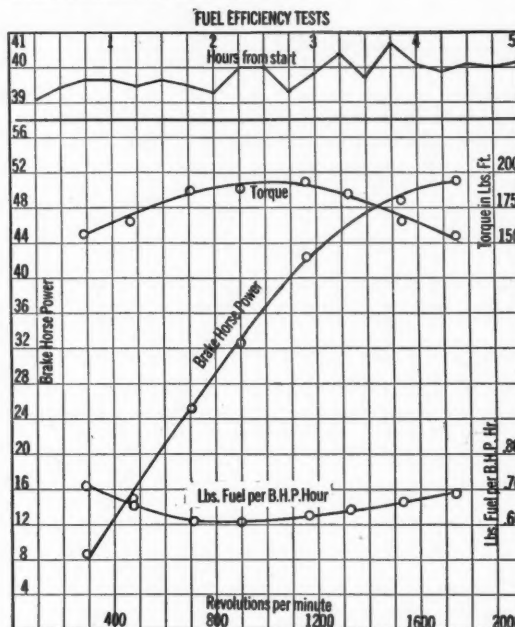


CHART No. 3.

TABLE NO. 3—FULL EFFICIENCY TESTS.

Short Runs at Various Speeds.

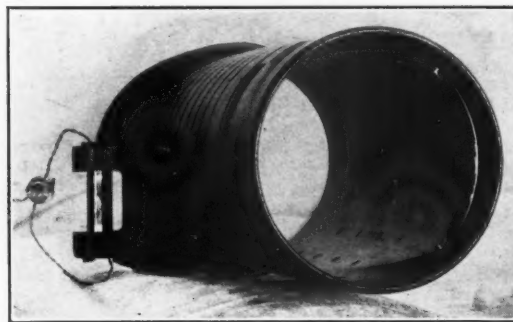
Run.	Duration Mins.	R. P. M.	Torque Pounds Feet.	Brake H. P.	Gas Cons. B. H. P. Hr.		Temperature Jacket Water.		Range.
					Lbs.	Gals.	In, F.°	Out, F.°	
A2	5	1739	154.3	51.1	.69	.113	93	184	91
B2	5	1529	167.5	48.8	.66	.108	87	173	86
C2	5	1325	183.3	46.3	.64	.105	85	176	91
D2	5	1161	192.2	42.5	.63	.103	93	173	80
E2	5	899	189.0	32.4	.61	.100	90	177	87
F2	5	706	187.0	25.1	.61	.100	102	174	87
G2	5	465	167.0	14.8	.66	.108	102	177	75
H2	5	288	158.5	8.7	.71	.117	107	167	60

Average barometer reading = 29.37

Five-Hour Test at Constant Speed.

Hour.	From	To	Average.		Gasoline per B. H. P.	
			R. P. M.	B. H. P.	Lbs.	Gals.
0	1	1116	39.5	.64	.105	
1	2	1108	39.5	.63	.103	
2	3	1116	39.8	.64	.105	
3	4	1120	40.2	.63	.103	
4	5	1112	40.0	.63	.103	
Average			1114	39.8	.63	.103

Average Barometer Reading = 29.45 in.  
 Average Water Jacket—In = 91° F.  
 Average Jacket Water—Out = 172° F.  
 Average Jacket Water Range = 81° F.  
 Average Room Temperature = 56° F.



PISTON AND PIN AND ONE OF THE SLEEVES, SHOWING EXCELLENT CONDITION AND SLIGHT CARBON DEPOSITS AT END OF TEST.



December, 1913

Test No. 12  
(10 pages) Page 6

## BULLETIN OF THE A. C. A. TESTING LABORATORY

**VOLUMETRIC EFFICIENCY TEST.**—Following the fuel efficiency test the carburetor, with no change in adjustment, was enclosed in an air box, which was clamped between the carburetor flange and the inlet manifold. The sole air inlet to this box was piped to a Venturi air meter, and the air consumption of the motor measured under the following conditions:

(A) Carburetor in place, motor running under own power.

(B) Carburetor in place, motor driven by dynamometer.

(C) Carburetor removed, motor driven by dynamometer.

From the air, power and other measurements taken in this run, the volumetric efficiency and other data given in Table No. 4 and Chart No. 4 were obtained.

## COOLING AND EXHAUST.

During the test thermo-syphon cooling was obtained by connecting the motor to a tank of water placed in approximately the same relative position to the motor as the radiator on the

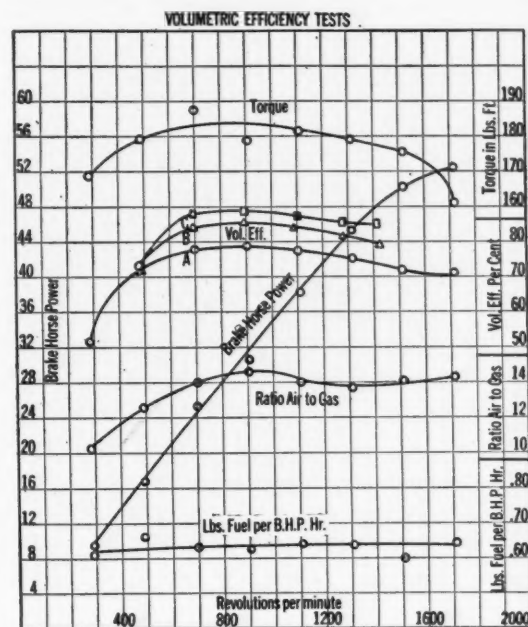


CHART No. 4.

Moline car. Sufficient cold water was added to the warm water in the tank to maintain an average temperature of 85°F. of water entering

TABLE NO. 4—VOLUMETRIC EFFICIENCY TESTS.

Run.	Dur'n. Mins.	R. P. M.	Torque Pounds Feet.	Brake H. P.	Cu. Ft. Air Per Minute.	Pounds Air Per Hour.	Pounds Gas Per Hour.	Ratio Air to Gas.	Gas Cons'n Per B. H. P. Hr.		Temperature. Water F.°			Press. Drop in Inlet.		
									Lbs.	Gals.	Vol. Eff. %	In.	Out.	Air Ent. Carb.	Ins. Hg. Barome- ter. Ins Hg.	
Engine Running Under Own Power.																
A3	6	1715	160.5	52.5	105.2	478	33.5	14.3	.64	.105	70.5	96	183	64	1.8	29.28
B3	5	1523	176.0	51.1	95.4	432	30.8	14.0	.60	.098	71.4	90	175	57	1.6	
C3	5	1318	179.5	45.1	87.3	396	28.9	13.7	.64	.105	75.9	89	176	56	1.5	
D3	5	1108	181.0	38.2	75.3	341	29.3	14.0	.64	.105	78.0	88	173	56	1.2	
E3	5	902	179.0	30.8	62.2	282	19.1	14.8	.62	.102	79.0	89	178	56	1.0	
F3	4	701	188.0	25.1	48.1	218	15.6	14.0	.62	.102	78.6	94	166	55	0.8	
G3	5	491	179.5	16.8	31.2	141	11.3	12.5	.67	.110	72.9	95	172	55	0.4	
H3	5	295	169.0	9.5	13.1	59	5.8	10.2	.61	.100	51.0	100	160	54	0.3	
Carburetor On—Throttle Wide—Engine Driven by Dynamometer.																
J3	1	1428			98.8						79.2	Mean	62	1.6	29.31	
K3	1	1285			91.6						81.6	Jacket	62	1.4		
L3	1	1093			80.6						84.5	Water	62	1.2		
M3	1	894			66.5						85.3	Tempera-	61	1.0		
N3	1	692			50.4						83.5	ture	60	0.8		
O3	1	481			30.2						72.0	117° F.	60	0.4		
Carburetor Off—Engine Driven by Dynamometer.																
P3	1	1405			104.0						85.0	Mean	58	0.8	29.31	
Q3	1	1275			94.9						85.2	Jacket	60	0.5		
R3	1.17	1101			84.6						87.9	Water	60	0.4		
S3	1	881			68.5						89.2	Tempera-	60	0.3		
T3	1	695			53.5						88.3	ture	60	0.3		
U3	1	486			30.2						71.3	112° F.	59	0.3		



Test No. 12  
(10 pages) Page 7

December, 1913

### BULLETIN OF THE A. C. A. TESTING LABORATORY

motor. The average temperature of water leaving the motor was 166° F.

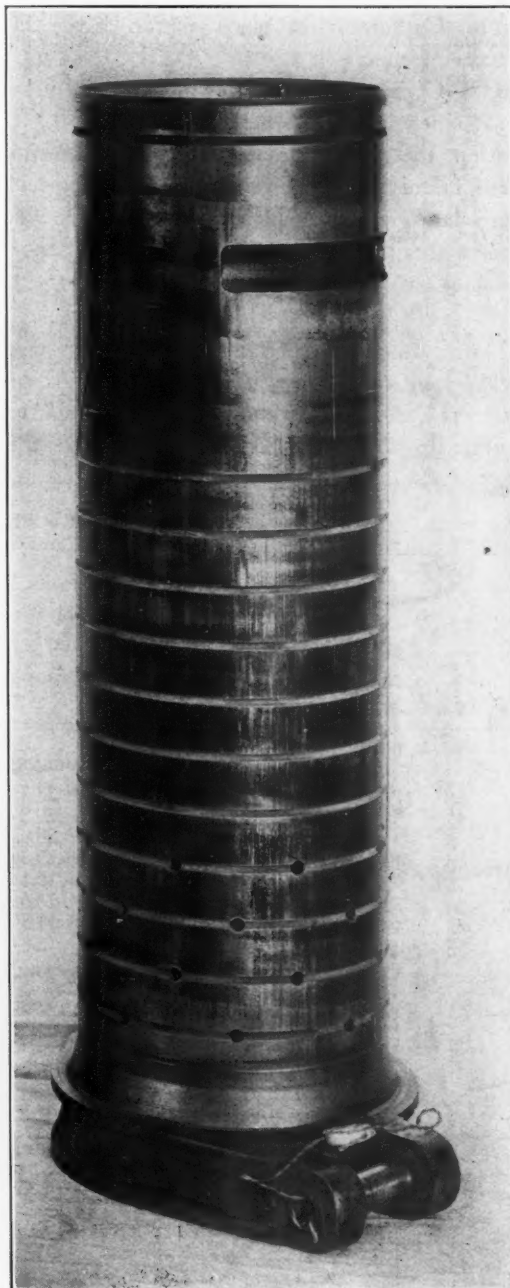
The exhaust from the motor was discharged into a short length of 2½-inch standard pipe, and thence into an expansion chamber from which it escaped to atmosphere through a long 3-inch vent pipe. The exhaust gas was slightly smoky during a portion of the test.

A blast of air, having a velocity of about 34 miles per hour was directed against the crankcase of the motor during the endurance and other runs in which the motor was developing power.

#### CONDITION OF MOTOR.

The motor was dismantled before and after the tests here reported, to permit careful inspection thereof. At the end of the test the parts of the motor were, without exception, in excel-

lent condition. There was no perceptible wear on the bearings, sleeves or other parts. The slight irregularities in the sleeves were built up with carbon to form close fitting, glossy surfaces. The ports in the sleeves were not burnt, and there was only a very slight deposit of carbon on the port edges. The cylinder heads and the tops of the pistons showed only a very thin coating of carbon, and only small quantities of carbon were found elsewhere. No shake could be felt



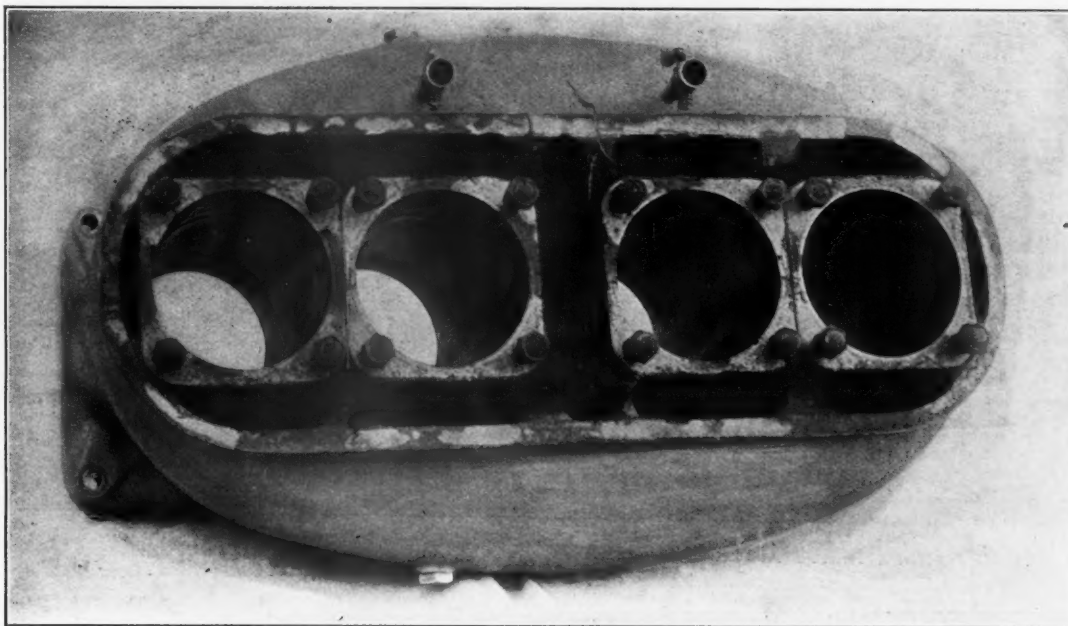
EXHAUST SIDE OF OUTER AND INNER SLEEVES, SHOWING POINTS BUILT UP WITH CARBON AND EXCELLENT CONDITION.



December, 1913

Test No. 12  
(10 pages) Page 8

## BULLETIN OF THE A. C. A. TESTING LABORATORY

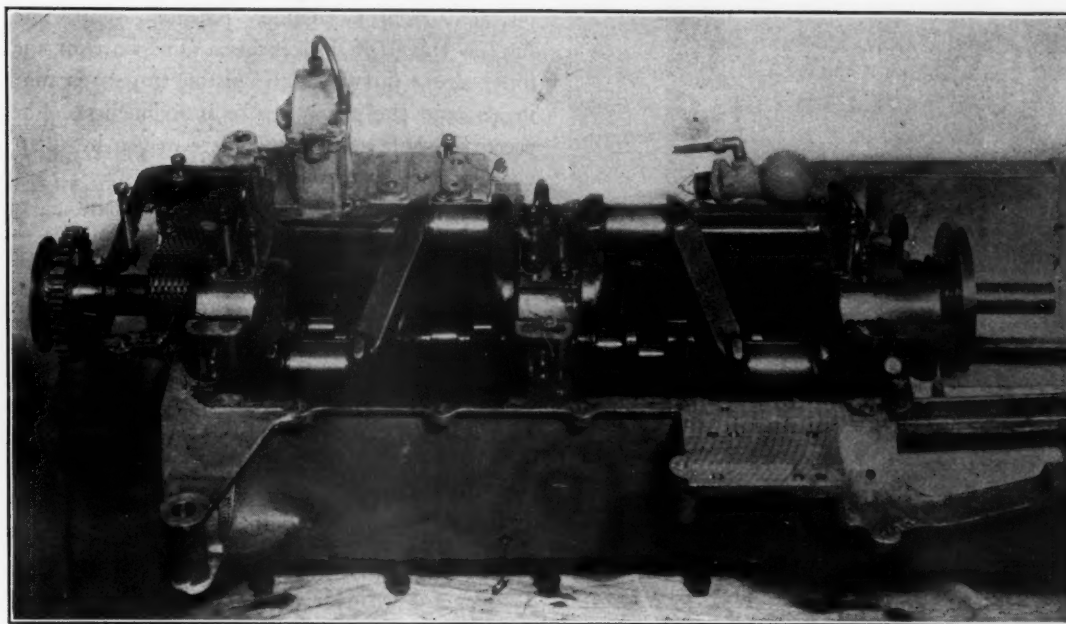


CYLINDER CASTING AS IT APPEARED AFTER ENDURANCE TEST.

in any bearing, and there was every indication of perfect lubrication. There was not a single ring in either piston or cylinder head which was not perfectly free at the end of the test. The running of the motor as regards noise and vibration was not appreciably different at the end of the test from that at the start and early hours.

PARTICULARS REGARDING MOTOR  
AND ACCESSORIES.

The manufacturers of the motor have filed with the Club an affidavit which states that the motor is a stock model in every particular, including design, material and workmanship, except as to the hot air supply pipe for the car-



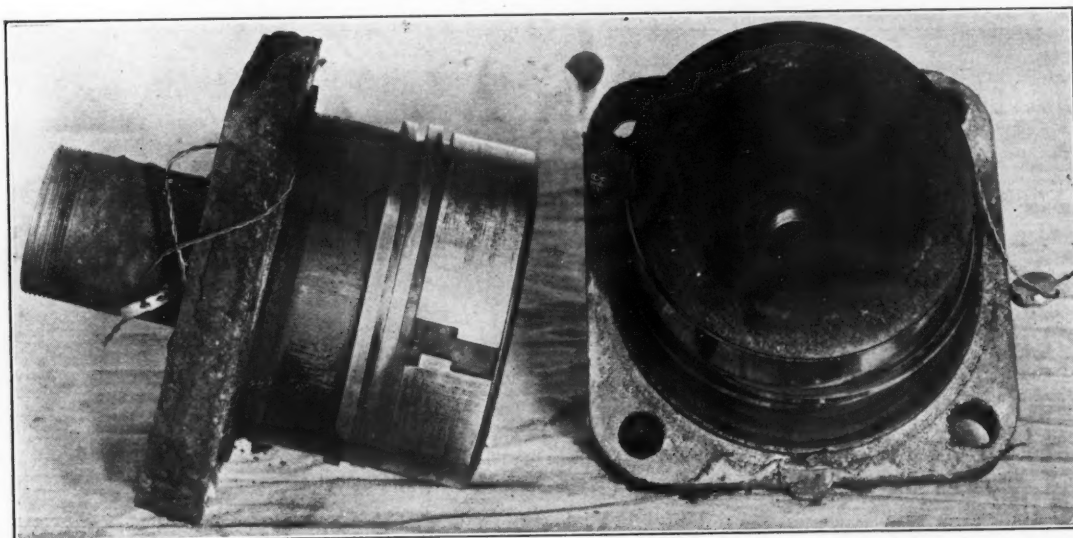
CRANKCASE, CRANKSHAFT, AND BEARINGS AS THEY APPEARED AFTER ENDURANCE TEST—ALL IN EXCELLENT CONDITION. NOTE ABSENCE OF OIL GROOVES IN BEARINGS.



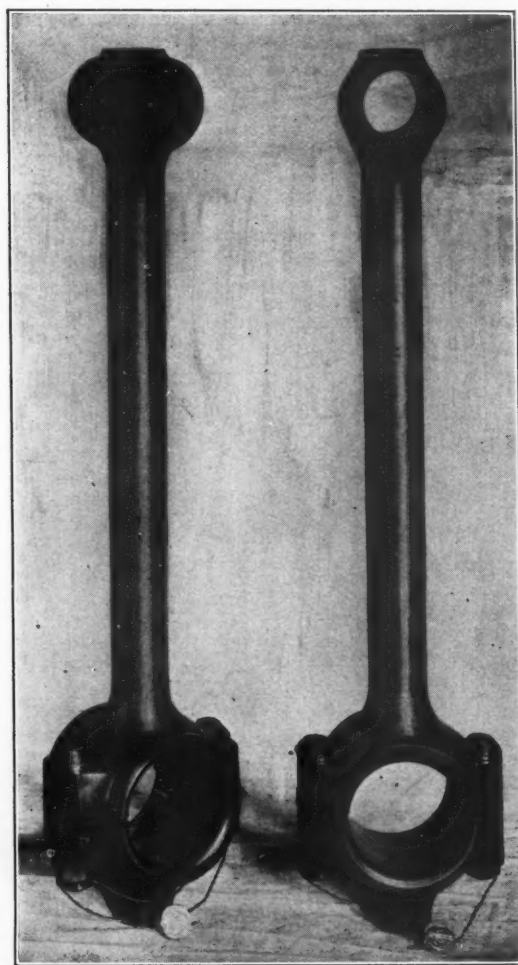
Test No. 12  
(10 pages) Page 9

December, 1913

# BULLETIN OF THE A. C. A. TESTING LABORATORY



CYLINDER HEADS AFTER TEST, SHOWING SMALL AMOUNT OF CARBON DEPOSIT.



CONNECTING RODS SHOWING EXCELLENT CONDITION OF GROOVELESS BEARINGS.

buretor, which was not used during the test, and which will be cast integral with the crankcase in all motors, except the first six produced. Of these six the motor tested is one.

The motor is of the four cycle type, and has four cylinders cast in one block with integral gas manifolds. The functioning of the motor is controlled by two concentric sliding valves with inlet and exhaust ports on opposite sides. The sleeves are actuated by short connecting rods, operated from a common eccentric shaft, and have a travel of  $1\frac{1}{8}$  inches. The bore of the inner sleeve, in which the piston travels, is four inches, and the piston stroke is six inches. The eccentric shaft and magneto are driven by silent chain from the camshaft.

The weight of the complete motor and parts is given below:

	Pounds.
4 pair sleeve connecting rods, including gas tank pressure pump.....	10.6
4 inner sleeves and pins.....	36.5
4 outer sleeves and pins.....	30.4
4 pistons with wrist pins and rings.....	15.8
4 connecting rods, complete with bolts and nuts .....	22.7
4 cylinder heads .....	27.3
1 cylinder casting, with studs and nuts..	130.4
1 cover for cylinder, 4 syphon tubes, 4 fibre insulating tubes and 4 lock nuts and washers.....	7.8



December, 1913

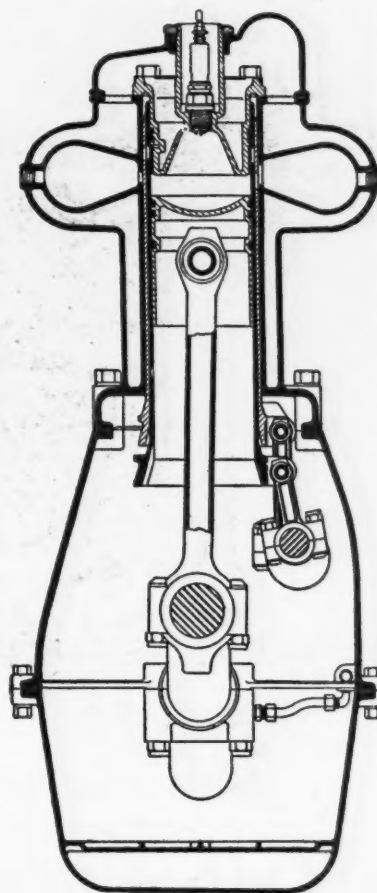
Test No. 12  
(10 pages) Page 10

## BULLETIN OF THE A. C. A. TESTING LABORATORY

1 carburetor .....	6.0
4 spark plugs and gaskets.....	1.1
1 fan with support and breather cap....	7.9
1 flywheel .....	116.6
Intake water manifold .....	4.5
Lower half of crank case, bolts and nuts.	31.0
Chain case cover, oil pumps and pipes....	9.6
Upper half of crank case, including extension over clutch and transmission, crank shaft, magneto, magneto wires, air pump for gas tank, oil pipes, chain, sprockets, bearings, studs and nuts.	232.5

Total weight (pounds)..... 690.7

**LUBRICATION.**—The motor is lubricated by a pressure feed system which operates as follows: Oil is drawn from the sump by a gear pump driven off the end of the eccentric shaft, and is delivered to the three main bearings, and the magneto drive shaft bearing under a pressure determined by the settings of a spring controlled by-pass valve, through which the excess oil is delivered. This excess oil is led to the chain driving the eccentric shaft and magneto, and flows thence to a trough and through a screen to the sump. Part of the oil delivered to the main bearings passes through holes in the crankshaft web to the crank pins, and thence through the tubular connecting rod to the hollow piston pins. From the two ends of the latter it flows to the sleeves and is distributed through holes and oil grooves in the latter over their circumference and the cylinder walls. All parts requiring lubrication not mentioned above are oiled by splash from the crank shaft and connecting rods. The flow of oil delivered under pressure is determined by a valve which is so connected as to open and close with the throttle. This valve was wide open in all tests here recorded. There are no oil grooves in any of the crankshaft bearings. The entire bottom of the crankcase is covered by a screen, through which the oil returns to the sump. On this screen, and in that of the trough mentioned above, there was some carbon and dirt strained from the oil. A similar deposit was found on the chaincase cover under the point where the combined breather and filler are located. The accumulation had evidently not interfered with the lubrication in any way.



TRANSVERSE SECTION THROUGH THE MOLINE-KNIGHT MOTOR.

**IGNITION AND CARBURETION.**—The carburetor employed was a 1½-inch, nominal size, model R. Schebler, which has a tapered needle whose position in the nozzle is controlled, through a lever connection, by the position of the air valve. No changes in the carburetor setting were made during the endurance test.

Ignition was furnished by a Bosch DU Model 4A Duplex magneto. Four Bosch plugs with heavy three-point electrodes were put in at the start of the test, and none of these were taken out of the cylinder or otherwise disturbed until after the endurance test was completed. The electrodes were partly burned away, so that the gap was increased, but the regularity of firing was notable throughout.

(Signed) F. R. HUTTON,  
Chairman Technical Committee.

(Signed) HERBERT CHASE,  
Laboratory Engineer.



# The Lewkowicz



Caught in a summer thunder shower. Not a house or a shelter in sight. But they have a LEWKOWICZ CONVERTIBLE BODY on their car. In less than sixty seconds it is converted into an inside drive. Everybody's dry. Off again as happy as ever.

## Buy Two Cars at the Price of One

When you buy a car equipped with a LEWKOWICZ CONVERTIBLE BODY you really get two cars. You have a touring car for pleasant days—and an inside drive as protection against rain, snow, cold, or for use in the evening at the opera, theatre, social calls, etc.

Ask that your new car be equipped with the LEWKOWICZ CONVERTIBLE BODY. No reputable manufacturer will refuse to do this for you—no matter what car you are going to buy.

Or if your car has already been delivered—at a slight additional cost you can equip it with the LEWKOWICZ CONVERTIBLE BODY and thus enjoy motoring to its fullest extent.

The LEWKOWICZ CONVERTIBLE BODY is the latest advance in the body-builder's art. It's delightfully easy to adjust in either direction. No tools are necessary. There isn't a screw, bolt or pin used to make the change. It can be done with white gloves—without soiling them. A delicate lady or even a child can convert this body in either direction.

When opened the LEWKOWICZ CONVERTIBLE BODY has the appearance of any high grade body. When closed it's solid and staunch—absolutely waterproof and cold-proof.

No matter what kind of a car you contemplate owning—or are owning now—you can have a LEWKOWICZ CONVERTIBLE BODY that will increase its appearance many times. We will be pleased to give you a demonstration—and full description.

Write for further details now.

### FORD OWNERS

The automobile body shown in the picture above was designed particularly for your use. You bought your car for its convenience, comfort and its adaptability to all sorts of conditions.

The LEWKOWICZ CONVERTIBLE BODY will add tremendously to the convenience and comfort that you will get out of your car—and make it adaptable for use 365 days in the year—and at a very reasonable cost.

Get in touch with us today and we will give you complete information.

## Convertible Automobile Body Corporation

The Holbrook Company of New York City has been licensed by us to build the LEWKOWICZ CONVERTIBLE BODY on all of the highest grade bodies which they are producing. The Holbrook Company has exclusive rights for the New York territory.

42nd Street and Broadway  
Longacre Building

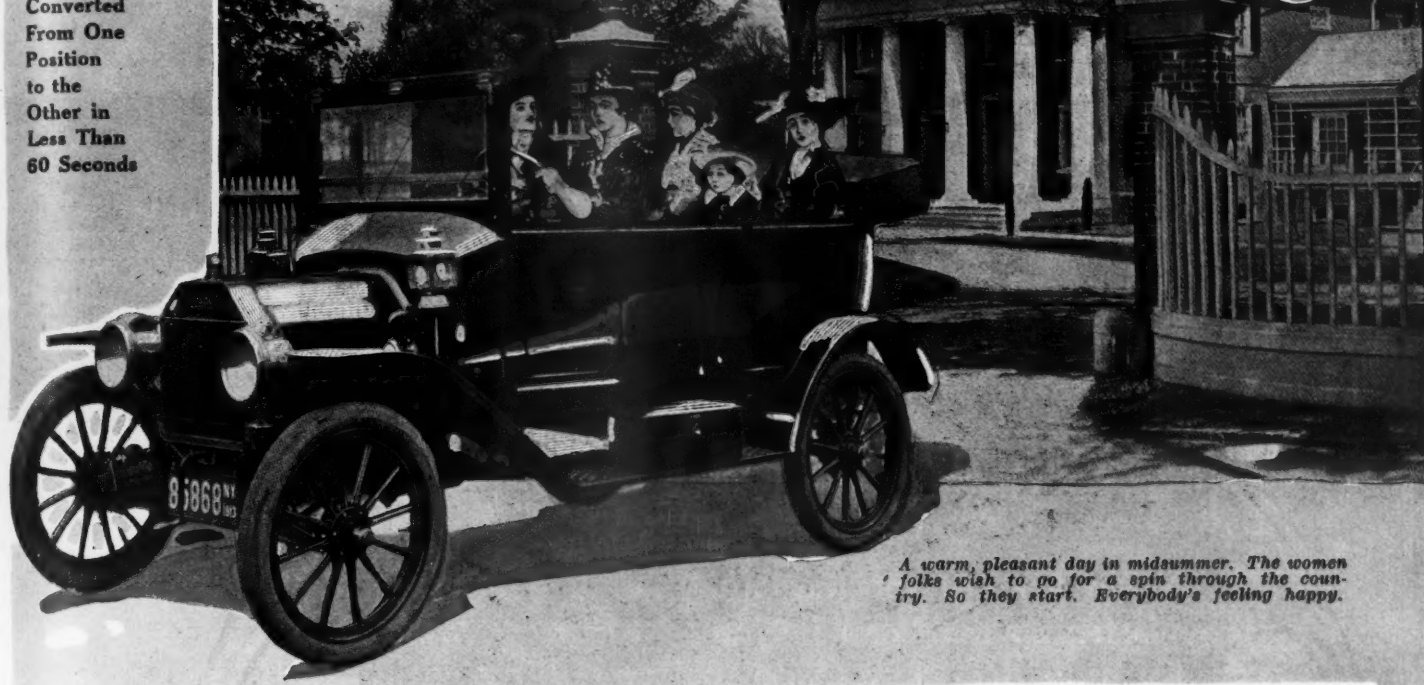
New York City  
PHONE BRYANT 7835

Factory, 128th St. and Park Ave., New York City. Phone Harlem 4390



# Convertible Body

Converted  
From One  
Position  
to the  
Other in  
Less Than  
60 Seconds



*A warm, pleasant day in midsummer. The women folks wish to go for a spin through the country. So they start. Everybody's feeling happy.*

## Manufacturers!

### A Lewkowicz Convertible Body Makes a Splendid Sales Argument

You manufacturers who are desirous of keeping in the vanguard of progress, should consider the LEWKOWICZ CONVERTIBLE BODY as standard equipment. Here's the opportunity to prove to your owners that you are always alert for their comfort and convenience.

The LEWKOWICZ CONVERTIBLE BODY gives the owner the pleasure of an open touring car with the convenience, comfort and protection of a limousine. Some men may *want* a touring car; others may *need* a closed car. The man who cannot afford to buy two cars will readily buy a car equipped with the LEWKOWICZ CONVERTIBLE BODY. Not only will your sales force have a splendid selling argument, but many a hesitating buyer will be closed by the fact that with your car he can have a convertible body.

### FORD AGENTS AND DEALERS:

Every car you sell should be equipped with a LEWKOWICZ CONVERTIBLE BODY. Every prospective buyer of a car really wants this convenience. And of the thousands of cars already in use in your territory every owner will gladly buy a LEWKOWICZ CONVERTIBLE BODY when you demonstrate its easy working and comfort-producing qualities.

Double your income by handling the LEWKOWICZ CONVERTIBLE BODY.  
Write us—today—for the agency in your territory.

**Convertible Automobile Body Corporation**  
Longacre Building  
PHONE BRYANT 7835  
42nd Street and Broadway, New York City

Factory: 128th St. and Park Ave., New York City. Phone Harlem 4390

37-0



# BOOTH BRAND

Shipment Guaranteed on Day Ordered



"Shoddy"



"Booth Felt"

What kind of service can be expected from washers which can be pulled to pieces with the fingers? Try to do the same thing with Booth Quality Washers.

The way we conduct this business is appreciated by our customers in the automobile industry quite as much as the quality of Booth Felt Goods.

We never insist upon holding manufacturers to contracts when conditions arise to make strict adherence to delivery specifications impracticable, nor do we trump up claims for goods made up on contract and not actually shipped. With our facilities we can wait until three or four days of delivery dates before making up an order, and in so doing we protect ourselves and the manufacturers as well. In all the years we have been furnishing several manufacturers with all their requirements in the line of felts, this has been our policy, and is worthy of special note that we never have missed a scheduled delivery.

No order possibly could be given which we could not make up and ship on the same day it is received, if necessary.

**N. E. BOOTH, 642-44 Pacific St., Brooklyn, N. Y.**

THE BOOTH FELT CO., Ltd., Gananoque, Ont.

**Booth**  
FELT WASHERS

*Quality  
remains long  
after price  
has been for-  
gotten*

*When Writing to Advertisers, Please Mention Motor Age.*

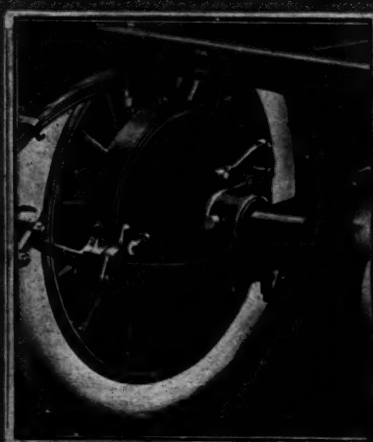


# FELT GOODS

Shipment Guaranteed on Day Ordered



"Shoddy Used"



"Booth Felt Used"

This is the final test. Shoddy quickly grinds to pieces when used as rear axle grease retainers. Booth Felt is the only material that will stand up.

Ability to deliver the goods on schedule has become a matter of pride with us. We keep a stock of about thirty thousand dollars' worth of special felts on hand, each numbered so that a customer can duplicate an order without samples to order from.

Booth Automobile Felts are cut exactly to blue print dimensions. Our equipment of dies is probably the most complete in existence. Our preparedness for large or small orders, however rigid the delivery, never makes it expedient even to think of substituting cotton mix felts for wool goods. Our integrity in all business dealings has won for us the confidence of manufacturers of almost every high grade car in the country.

Booth Felts are used for:

Washers of every size for hubs, rear axle grease retainers, steering gears, speedometers, carburetors, and for every other purpose where a washer is needed in a motor car assembly; strips for radiator cushions; squeak preventative between chassis and body; strips for sashless limousine windows; bumpers; plugs and washers for magnetos; oiling wicks for spring bolts. We also make all kinds and shapes of gaskets without expensive dies.

**N.E. BOOTH, 642-44 Pacific St., Brooklyn, N.Y.**

THE BOOTH FELT CO., Ltd., Gananoque, Ont.

What-  
ever the  
use Booth  
Quality is  
economy

**Booth**  
FELT WASHERS



# PAIGE "36" The Car

This is literally true. We are now shipping the first of several trainload orders. This first order goes to the Payne Motor Car Company, Des Moines, Iowa. It consists of thirty solid carloads of Glenwood models.

This gives us the distinction of shipping the first



PAIGE "36" Glenwood com  
including electric lighting  
and starting . . . . .

## PAIGE-DETROIT MOTOR

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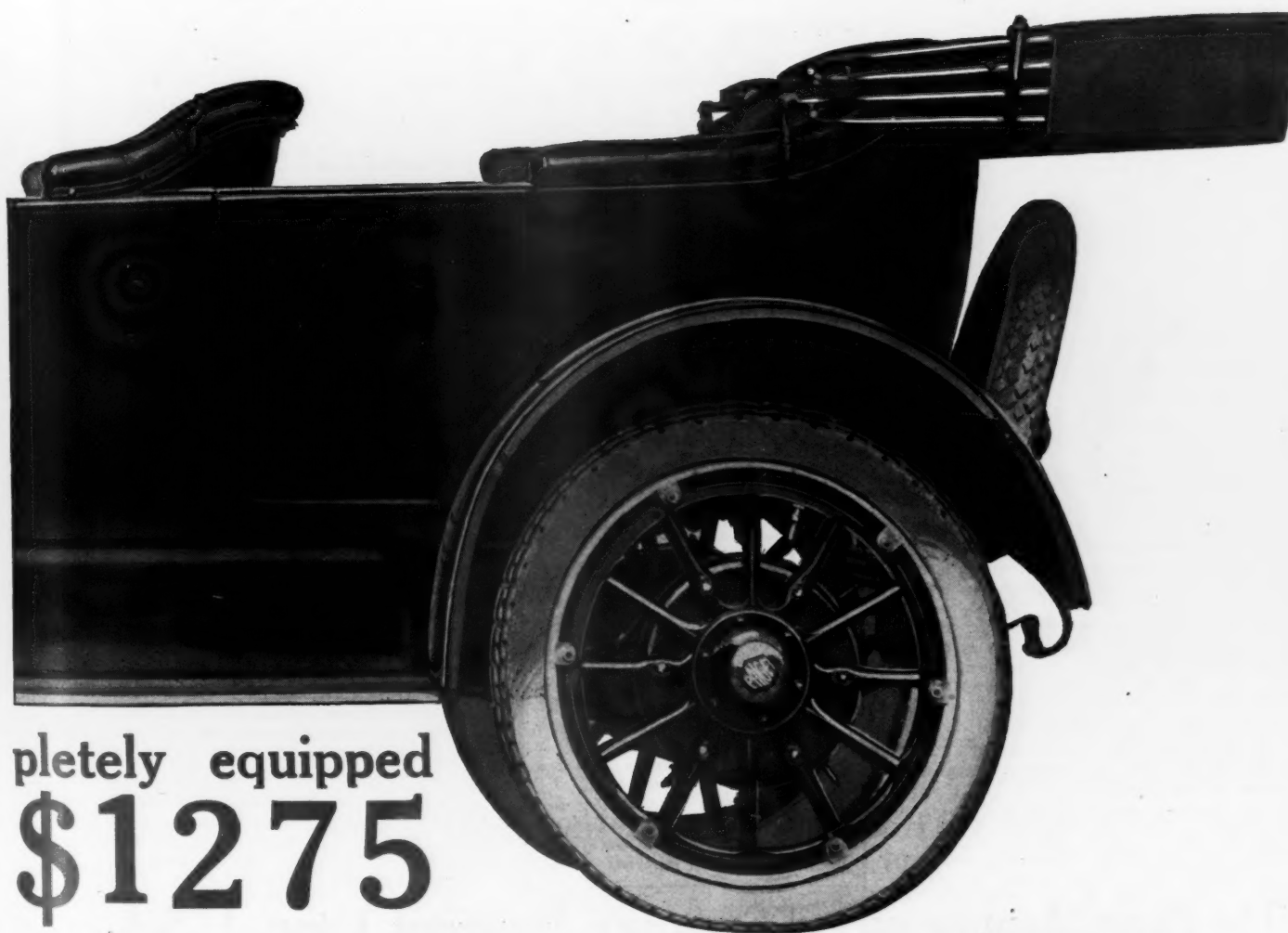


# That Is Selling by the Trainload

trainload order that has ever gone into the State of Iowa.

The tremendous popularity of Paige cars is due to the fact that they are the greatest extra value motor cars ever produced.

Prove this for yourself at the shows.



pletely equipped

**\$1275**

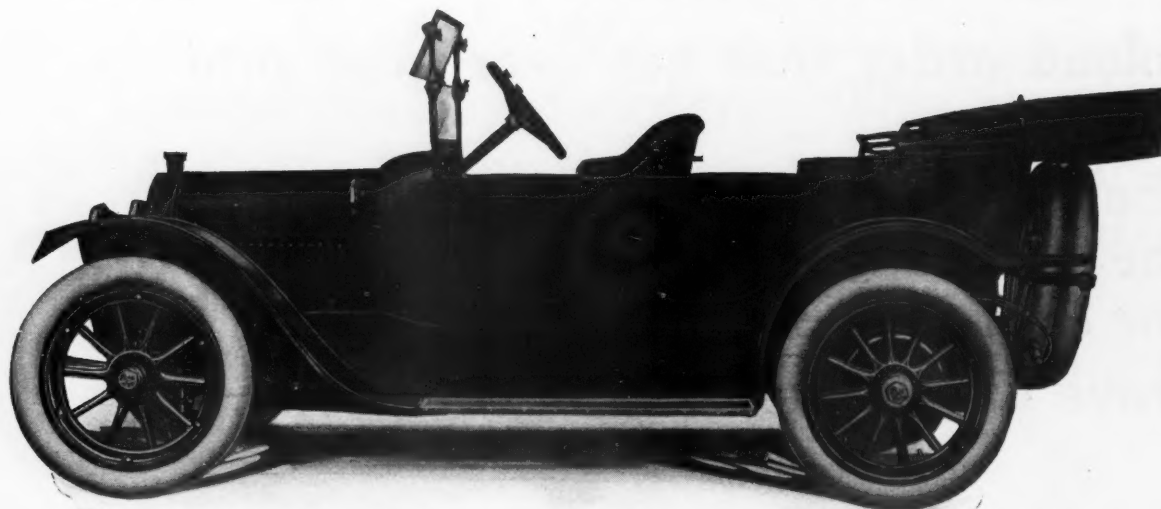
**CAR COMPANY, DETROIT**

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**POPE QUALITY HAS NEVER BEEN QUESTIONED**

## THE NEW POPE-HARTFORD



**POPE LONG STROKE MOTOR  
FOUR CYLINDERS  
FORTY HORSEPOWER  
FOUR SPEED, ROLLER  
BEARING TRANSMISSION**

**Model "35"**  
**\$2250.**  
**FULLY EQUIPPED**

**ELECTRIC LIGHTING  
ELECTRIC STARTING  
POPE CARBURETOR  
LEFT SIDE DRIVE  
CENTER CONTROL**

**Acclaimed by critical and discriminating buyers at the  
New York show as the supreme automobile value.  
See it at Chicago, space C-4. In the Armory.**

Every Improvement—Every Convenience—Every Device, calculated to give prestige to the 1914 Motor Car and proven Scientifically and Mechanically Worth While, is found as a component part of the New Pope-Hartford, Model 35. In combination with all these features, the basic principles of Pope Construction remain unchanged.

Model 35 is built in the POPE FACTORIES in Hartford.

It is the most complete and most lastingly serviceable four-cylinder motor car that it is possible to build, regardless of price. YOU CANNOT ASK FOR A BETTER CAR—YOU CANNOT GET A BETTER EQUIPMENT. The long stroke motor embodies all of the well tried POPE features. It is most ECONOMICAL in oil consumption. It is the most POWERFUL motor of its size known to the industry. The Ignition is by "Bosch" High Tension Dual System. The ROLLER BEARING, FOUR SPEED, selective type TRANSMISSION is recognized as the equal of any and in many respects SUPERIOR TO MOST of the transmissions in use, even in the highest priced 1914 models.

In accord with the practice now prevailing, the STEERING gear is located at the LEFT SIDE, with gear change and brake levers in the center.

The Braking surface has been considerably increased in area.

The gasoline supply is force fed from a tank at the rear of the chassis, by pres-

sure generated by a plunger pump, operated from the cam shaft.

The GRAY & DAVIS ELECTRIC STARTING AND LIGHTING SYSTEM has been materially improved. Its action is positive, quiet and economical in its consumption of electrical energy.

We have designed NEW METAL BODIES for Model 35, wholly different in appearance from those heretofore used, combining straight line and curve effects, attractive and modish. The enlarged seating space and new method of upholstering afford a large measure of comfort to the occupants. Another new feature is the control board located beneath the cowl, whereon are mounted the coil, lamp switch and other instruments.

TOURING CAR OR ROADSTER, \$2250  
—COUPE, \$2850. Rudge-Whitworth wire wheels optional at an extra charge.

MODEL 35 HAS BACK OF IT 36 YEARS' EXPERIENCE in the manufacture of highest grade mechanical vehicles and 18 years in the making of Quality Automobiles. OUR CATALOG TELLS THE COMPLETE STORY. SEND FOR IT. THEN SEE THE CAR ITSELF.

### A Word to the Dealer

It is significant that practically EVERY DEALER who handled the POPE-HARTFORD line in 1913 is ENTHUSIASTIC over MODEL 35 and will continue in his loyal support of the POPE Product. This is the logical result of square dealing, backed by a car that gives its every owner a full measure of satisfaction.

If you reside in territory not now allotted IT WILL PAY YOU, as it has hundreds of dealers, to get in touch with us.

**The Pope Manufacturing Company, Hartford, Conn., U.S.A.**

**RESPONSIBLE BUILDERS OF RELIABLE MOTOR CARS**

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# WARNER

## QUALITY AUTO-METER



### The \$10,000.00 Accuracy Test

**H**ERE is the machine that has made the Warner Auto-Meter famous throughout the world for its unfailing accuracy.

This wonderful testing apparatus cost us considerably over \$10,000.00.

On this machine each Warner Auto-Meter is given a most thorough and exacting test.

Each instrument must give unvarying accuracy at every possible speed.

This costly and ingenious testing apparatus, itself, has never been known to vary the smallest fraction of a mile.

Thus when your car is equipped with a Warner you are assured that you possess the most accurate speed and mileage indicator it is possible to build.

You can have a Warner Auto-Meter on the car you buy if you ask for it.

### Stewart-Warner Speedometer Corporation

Factories: Beloit, Wis. Chicago, Ill.

Branches:	Atlanta	Chicago	Indianapolis	Los Angeles	Paris	St. Louis
	Boston	Cleveland	Kansas City	Minneapolis	Philadelphia	San Francisco
	Buffalo	Detroit	London	New York	Pittsburgh	

Nearly 100 Service Stations



# REPUBLIC

2000  
POUNDS  
CAPACITY

# \$1425.

## DEALERS:—These Standard Parts Insure the Service Your Prospects Demand

**Continental 3¼x5¼" Four Cylinder Motor**—A motor that is known throughout the industry for its dependability, smoothness and power.

**Covert Transmission**—Strong and durable. Designed especially for trucking purposes and found only on the better class of trucks.

**Hyatt Roller Bearings** are used throughout the Jackshaft and Transmission, insuring the delivery of maximum power through these units with the least loss.

**Lavigne Steering Gear**—A steering gear which has a reputation for efficiency second to none. Built for hard work and continuous service.

**Lewis Springs**—A combination of elasticity and strength, built of the highest grade spring metals procurable.

**Schebler Carburetor**—The heart of the truck. Schebler produces perfect carburetion under all and any conditions.

Buyers in all lines of business are appreciating the fact that a "standardized" product means—better service—less up keep expense—longer life and a reasonable initial cost.

This is especially true of the motor truck industry where various parts manufacturers have enormous investments in plants and special equipment for turning out the different parts—transmissions, motors or axles.

The Republic Truck is made up of different "standardized units," each one made by a specialist in that line and backed by the name and prestige of the maker.

**Eisemann Magneto**—Pronounced the most efficient magneto for trucks. Found on the highest grade trucks in the market.

**Culver-Taylor Chains**—Built by chain experts who produce only truck chains. Recognized universally as the chain of 100 per cent efficiency.

**Bower Roller Bearings** are used in the four wheels on account of their non-adjustable features and ability to withstand the strains of this service.

**Left-Hand Drive**—A feature found on all up-to-date models of trucks and pleasure cars. The correct form of drive and being adopted by all leading makers.

**Center Control**—Ease of operation and working in complete accord with the left-hand drive.

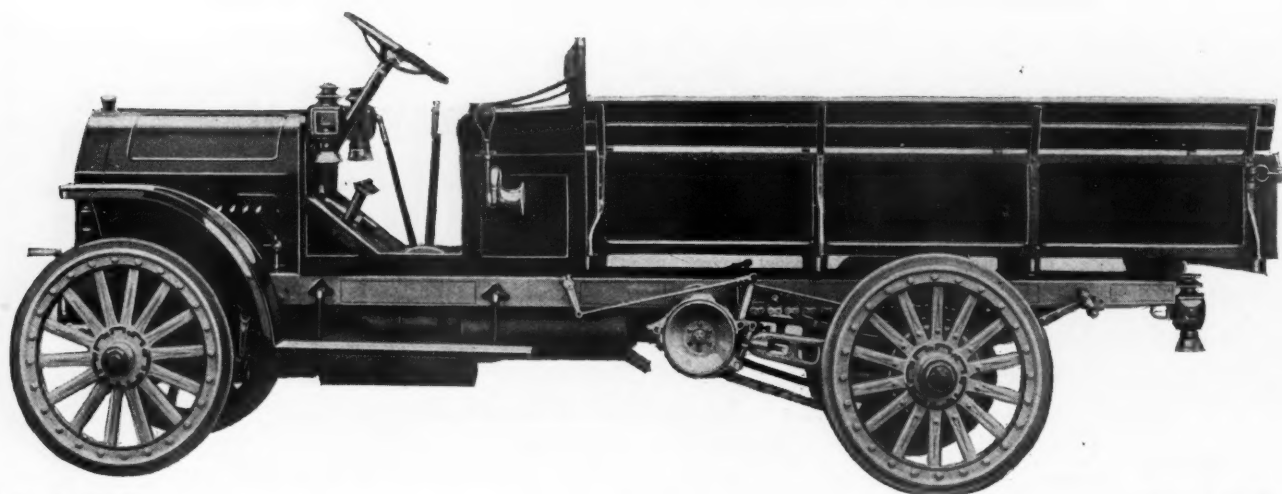
**Tires**—34x3 inch front, 34x4 inch rear demountable.

**Body**—Option of two types. Designs and quotations furnished on special types.

**Dealers**—You will find that the sales value of Republic Trucks, as well as the service given by them, is greatly increased by the use of these "standardized" parts.

In addition to being "standard," the Republic Units have a great factor of safety—in fact, many of them are the same as used on some of the leading 1½ and 2 ton trucks.

Your customer realizes that these parts will give him the service he has been looking for. You can make a very fair and profitable arrangement for the sale of Republic Trucks in your territory by getting in touch with us at once.



# \$1425

Republic Truck Fitted With Standard Express Body. One Ton Capacity Truck. Option of either Stake or Express Body.

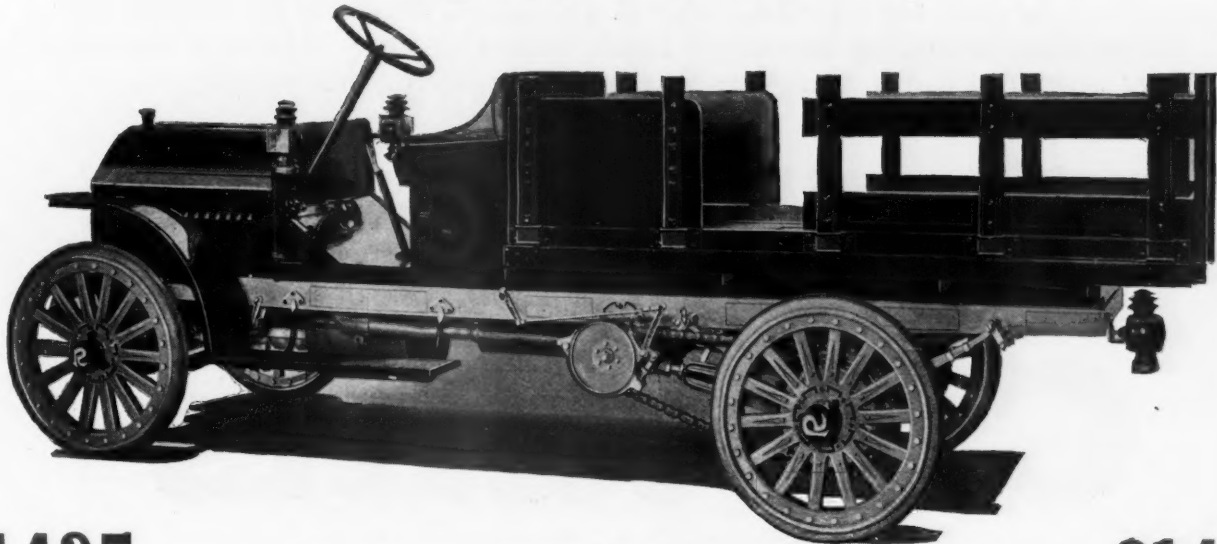
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# REPUBLIC MEANS SERVICE

**This Service Is Backed Up By Stations  
Throughout the Country**



**\$1425**

**One Ton Republic Truck, Standard Stake Body**

**\$1425**

Many business houses have hesitated to install motor haulage on account of the difficulty in finding a truck that would give them the dependable day in and day out service that they demand.

All over the country, Republic Trucks are proving to satisfied owners that their installation always results in greatly increased transportation efficiency.

The splendid service rendered by Republic Trucks is further backed up by the Republic Service Stations all over the country.

These stations are in turn backed up by the factory—the whole aim of both being—to insure the user everything he can expect in the way of efficient service.

We would be glad to send you details of the application of a Republic Truck to your particular transportation problems.

## Republic Service Stations

CHICAGO, ILL.	5129 Broadway
BINGHAMTON, N. Y.	197 Waters St.
PITTSBURGH, PA.	Beattie & Mignonette Sts.
SYRACUSE, N. Y.	571 S. Clinton St.
LOS ANGELES, CAL.	Pico and Hill Sts.
MINNEAPOLIS, MINN.	1507 Hennepin Ave.
COLUMBUS, OHIO	215 N. Fourth St.
DETROIT, MICH.	225 Cass Ave.
ATLANTIC CITY, N. J.	2720 Atlantic Ave.
FORT WORTH, TEX.	
BALTIMORE, MD.	720 E. Pratt St.
ST. LOUIS, MO.	4700 Washington Blvd.
SAN FRANCISCO, CAL.	60 Van Ness Ave.
SEATTLE, WASH.	1409 Twelfth Ave.
HONOLULU, HAWAII	
PHILADELPHIA, PA.	22nd and Race Sts.
BOSTON, MASS.	110 Trowbridge St.
ATLANTA, GA.	Washington St. Viaduct
and Many Other Places	

**Alma Motor Truck Company**

**Factory, Alma, Michigan**

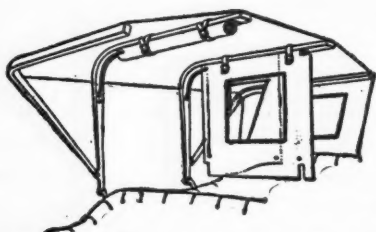
**Sales Office, Detroit, Michigan**

*When Writing to Advertisers, Please Mention Motor Age.*



Every man with "sense enough to come in out of the rain" will now have Collins Always-Ready Curtains on his car. Snap!—Snap!—quick as a flash!—and they're in place—from the *inside*—without leaving your seat. No fumbling under the rear seat for one curtain after the other. No getting the wrong curtain half on—then having to change. No standing in the rain and mud outside—then tracking the mud back into the car. Here is the biggest improvement that has come to motoring in years!

# Collins *Always Ready* Curtains



Collins Curtains are always ready, strapped to the bows under the top. All that is necessary is to unbuckle them, slide them down the curved bracket bar, swing into place and clinch them. The right Curtain for the right place is *always* at your fingers' ends.

And when the sun comes out again, it is far simpler to swing them back and strap them into place than the old method—and it is compulsory, for they are attached to the bracket bar, so they can *never* be out of place.

Another thing—Collins Curtains are always in good condition—for when not in use they are neatly rolled—not

tolded. With the old style curtains you never know what condition they will be in when you pull them out from under the seat—sharp kinks, broken and buckled celluloid lights.

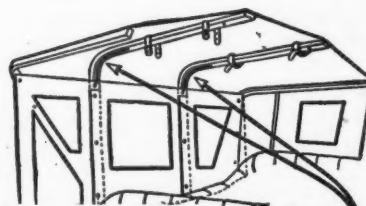
Be sure to have Collins Always-Ready Curtains on the car you buy. The manufacturer or the dealer from whom you purchase will probably be glad to see that you get them. For he wants to sell you as up-to-date a car as he can.

These up-to-the-minute manufacturers have recognized the advantage of Collins Always-Ready Curtains:

They are now regular equipment on the Cadillac, Chalmers, Haynes, Cole, Pullman, Havers, Herreshoff, Jeffery, National, Lyons-Atlas, Apperson, Winton, Stearns-Knight, Moon, Velie, Davis, Speedwell, Jackson, Pratt, Palmer, Stanley and McFarlan.

To Ford owners: We can now furnish Collins Always-Ready Curtains for Ford cars.

We license top manufacturers to furnish Collins Always-Ready equipment with new tops or to equip old tops.



You can have Collins Always-Ready Curtains on your new car. You can have Collins Always-Ready Curtains on the car you are now driving.

Any top builder can apply them at a moderate charge, and the Collins attachment is applicable to any top and to your old style curtains.

There are some imitations and evasions of the Collins patents, which in some respects resemble Collins Curtains, but they do not have Collins advantages. Look for the exclusive Collins curved bracket bar and the Collins license tag.

Be sure to see Collins Always-Ready Curtains at the Chicago, Boston and Philadelphia Automobile Shows—or better still, write us today and we will tell you where you can see them now.

**NoveltyLeather Works** Dept. B.  
Jackson, Michigan



# You are losing truck sales, I can show you where

I want to *call* on you next month—no obligation to you. Your ideas will well pay me for my trouble, and my experience, which has helped make the Sternberg truck the third best seller in New York City, may be interesting and valuable to you.

You know that the average commercial car dealer is far from 100% prepared to take advantage of his sales opportunities. It's not his fault so much as the limitations of the average commercial car line. I want to show you how the Sternberg line broadens your field—and gives you *special*, individual sales advantages—and *these are the factors which help the truck dealer to bigger, quicker profits.*

I want to meet the alert men—both pleasure car and truck dealers—who want to do things above the common place, and I believe it doesn't take formal introduction and wire-pulling to get the ear of that kind of men. They are big enough to do commonplace things like returning a coupon.

## New 2½ Ton Worm Drive

Sternberg trucks are built in 2, 3, 4, 5, 6 and 7 ton capacities. Only two or three other trucks are so staunchly built. The new 2½ ton worm drive Sternberg is a new achievement in simplifying the chassis and decreasing unsprung weight.

Send back the coupon. Chances are your city is on my route. If not, I will write you instead of calling, but give me the chance to do one or the other. No obligation to you—not the least. Send me the coupon.

VICTOR L. BROWN,  
General Manager.

**Sternberg Mfg. Co.**  
West Allis, Milwaukee, Wis.

**This  
Ad is  
an  
Earnest  
Message**

**Send  
Back  
the  
Coupon**

MR. VICTOR L. BROWN  
General Manager,  
WEST ALLIS, MILWAUKEE, WIS.

If convenient for you, you may call on me next month, providing this does not obligate me in any way. You may also send details of the Sternberg line.

Name .....

Address .....

When Writing to Advertisers, Please Mention Motor Age.





MERZ



JENKINS



DISBROW



HERR



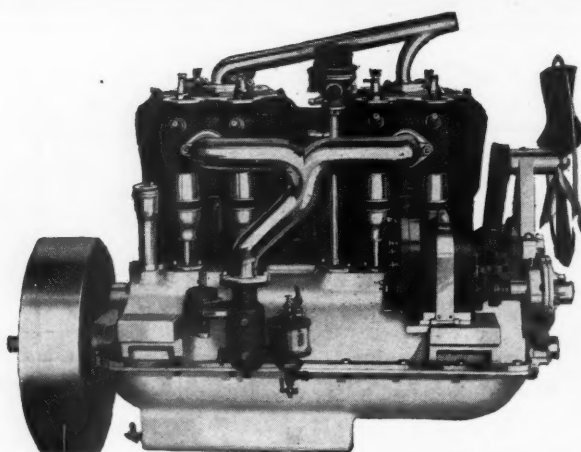
KNIPPER



HUGHES



COOPER



## Wisconsin Motor

CONSISTENT

### Leads the Field

If tests are proof, the performances of Wisconsin Motors during the last season speak for themselves. At Corona, Earl Cooper, driving a Stutz car equipped with the consistent, long-stroke Wisconsin Motor, made a world's record, driving 301.81 miles in 4 hours, 2 minutes, 38 seconds—without even raising the hood.

Bob Burman led the field at the Indianapolis Speedway Race for 150 miles when his carburetor caught fire. Gil Anderson then was the leader until a slight misfortune put him out with only a few laps to go. Chas. Merz finished third with his car afire. The splendid record of these men was made possible by consistent, reliable, powerful Wisconsin Motors. That this motor is always a strong contender for international honors is shown by the following records made this season by cars equipped with it.

#### The Roll of Honor

Date	Race	Place	Distance	M. P. H.	No. of Starters	Car	Driver	Position
Mar. 2	Free for All	San Diego, Cal.	200 M.	59.00	6	Stutz	Cooper	2nd
July 5	Int. City Race	Tacoma, Wash.	102 M.	65.17	8	Stutz	Parsons	1st
July 5	Int. City Race	Tacoma, Wash.	102 M.	63.87	8	Stutz	Cameron	2nd
July 7	Potlatch Trophy	Tacoma, Wash.	200 M.	71.07	7	Stutz	Cooper	1st
July 7	Potlatch Trophy	Tacoma, Wash.	200 M.	63.15	7	Keeton	Burman	2nd
July 7	Monta Marathon	Tacoma, Wash.	250 M.	70.71	10	Stutz	Cooper	1st
July 7	Monta Marathon	Tacoma, Wash.	250 M.	68.28	10	Tulsa	Hughes	3rd
Aug. 9	Free for All	S. Monica, Cal.	445 M.	73.77	14	Stutz	Cooper	1st
Aug. 31	Elgin National	Elgin, Ill.	301 M.	71.5	12	Stutz	Anderson	1st
Sept. 4	Free for All	Corona, Cal.	301 M.	74.63	9	Stutz	Cooper	1st
Sept. 4	Medium Car	Corona, Cal.	251 M.	75.03	6	Stutz	Cooper	(*)

(\*) World's record.

Feb. 10th, Cooper, driving against time in a Stutz car, established a world's record for 200 miles on a dirt track, doing the distance in 3 hours, 27½ minutes.

Wisconsin Motors have won many other events of both great and minor importance. Testimony of their absolute reliability and correct mechanical construction is offered by America's foremost track drivers, a few of whose faces are presented on the margin herewith. Each one of them is a Wisconsin Motor enthusiast.

Write for Catalogue Today

**Wisconsin Motor Mfg. Company,** Dept. 30  
Milwaukee, Wis.



KERN



PARSONS



LEWIS



GRANT



CLARK



ANDERSON



CHANDLER



BURMAN

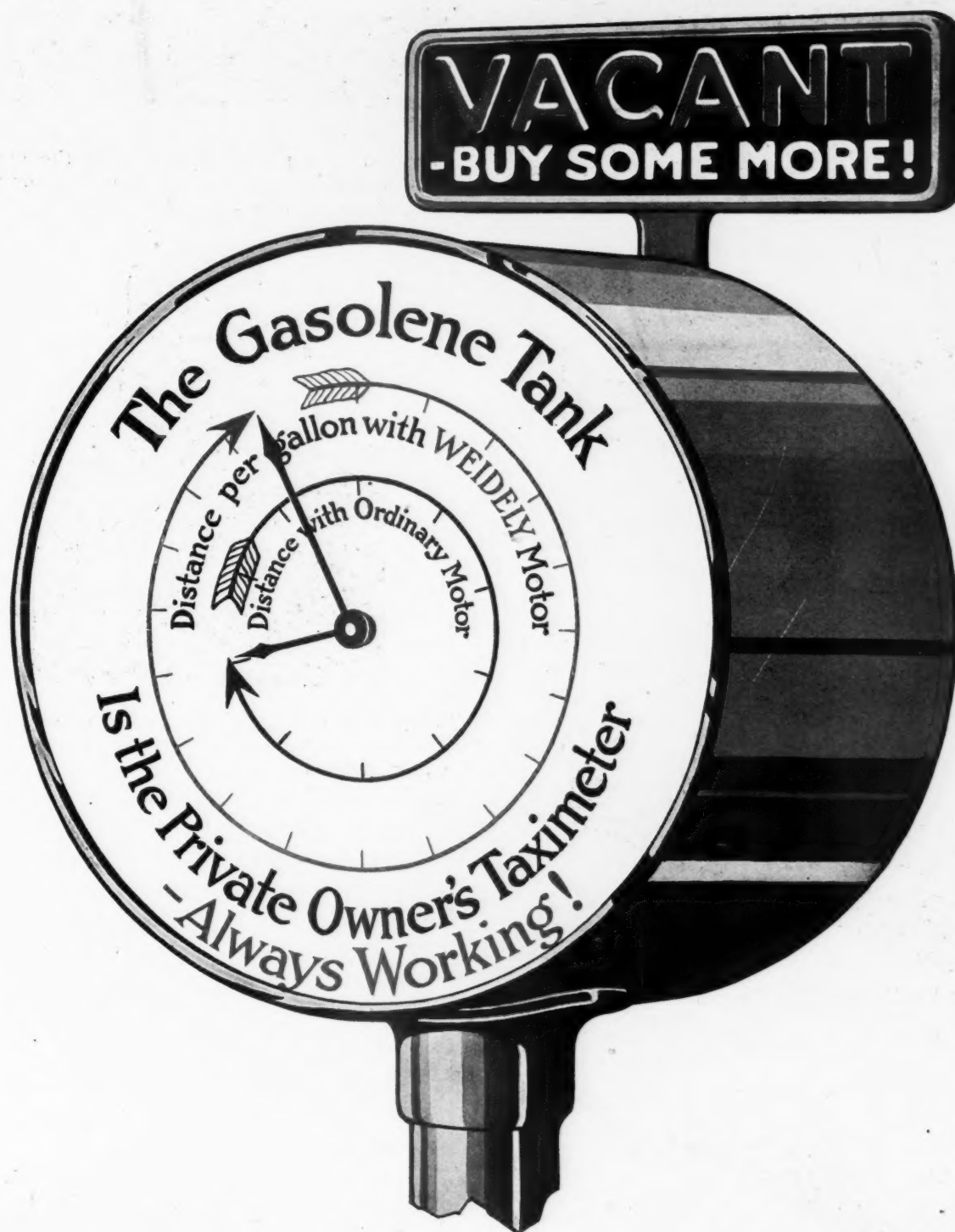


ENDICOTT



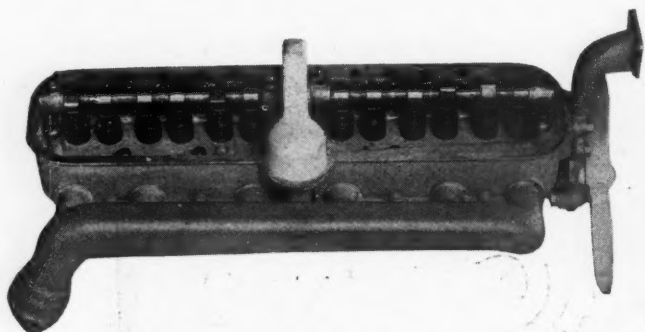
NIKRENT



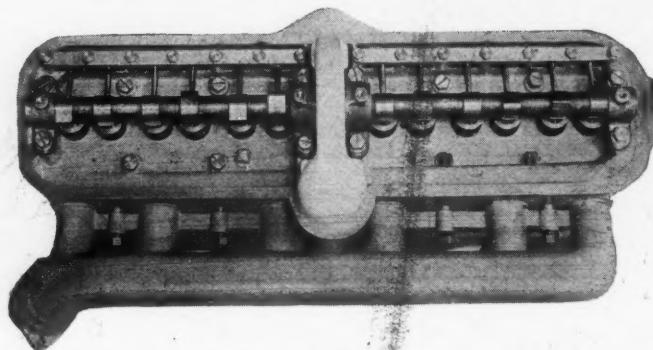


When Writing to Advertisers, Please Mention Motor Age.

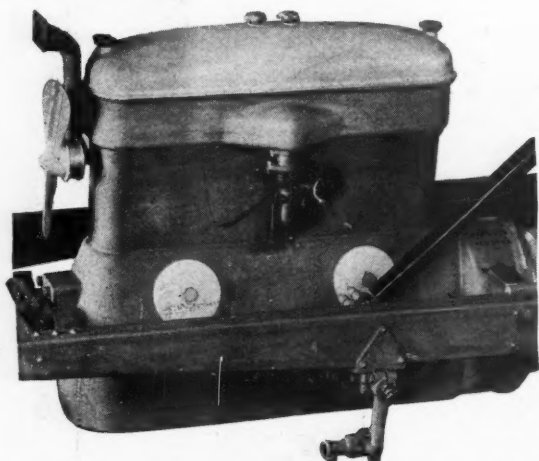




Head of Weidely Motor with cap removed. Note simplicity of valve mechanism. No rocker arms, plungers or heavy rollers.



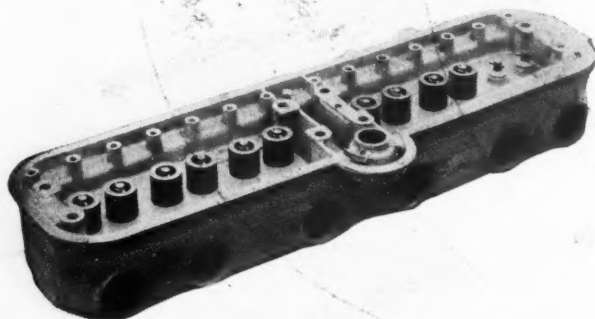
One cam-shaft placed directly over the valves, in turn operated by a single vertical shaft employing large gears, simplifies and silences.



View of Weidely Motor with head cap in place. No outside moving parts—nothing to gather dirt.



Front view of Weidely Motor. Note unification of design. Radiator mounts directly on motor—no rubber water connections.

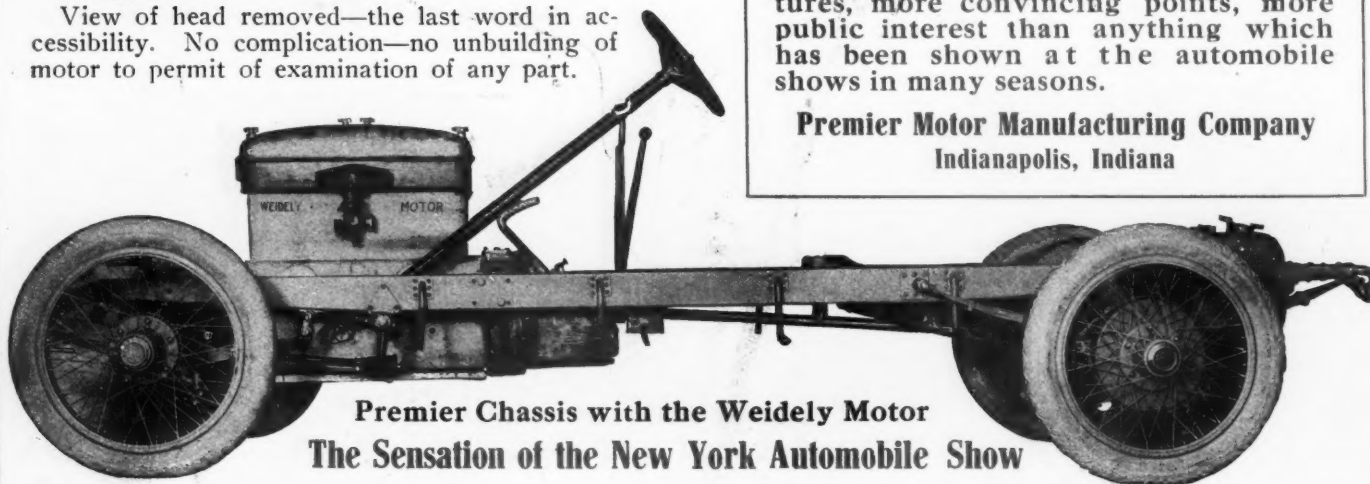


View of head removed—the last word in accessibility. No complication—no unbuilding of motor to permit of examination of any part.

### Mr. Dealer:

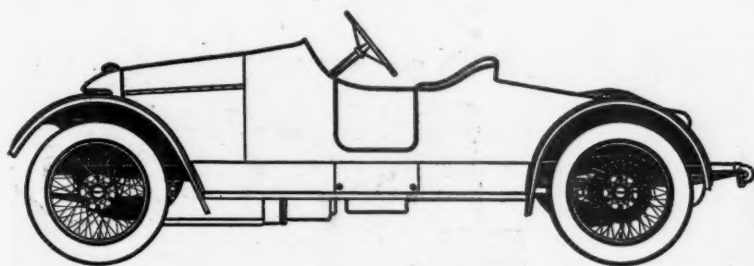
Examination and study of these pages devoted to the Premier car with the Weidely Motor will convince you that here is the line that has more real features, more convincing points, more public interest than anything which has been shown at the automobile shows in many seasons.

**Premier Motor Manufacturing Company**  
Indianapolis, Indiana



**Premier Chassis with the Weidely Motor**  
**The Sensation of the New York Automobile Show**





## PREMIER

**The Dealer who has not seen the Weidely Motor** owes to himself its inspection before he decides which car he will sell during the 1914 season.

**For the Question of SELLING cars now revolves** about the point of *economical maintenance*. Most standard cars are well made and reliable. But the operating costs of many still are excessive. "What will this car cost to operate?" is the question buyers are asking themselves today.

**The Weidely Motor has fewer parts than any other** six-cylinder motor—no complication—less weight—greater power—and travels more miles on a gallon of gasoline than any *four-cylinder* motor of equal size.

**The difference is this: All the valves are located** directly in the cylinder heads and are operated by a single cam-shaft placed directly *over* the valves. This shaft in turn is operated through a vertical shaft driven by large gears.

**Thus all rocker arms, all plungers and rollers are** unnecessary and therefore are eliminated. This means *permanent* quiet in an overhead valve motor. And it permits of perfect lubrication of all the valve mechanism. It permits 25% added efficiency—25% more power and speed.

**But the best of it is, from the owner's standpoint,** in that it *saves 40% of the operating cost*, the saving that buyers want today. And it gives dealers a leverage in selling the *Premier Car* that no agent of any other car can offset.

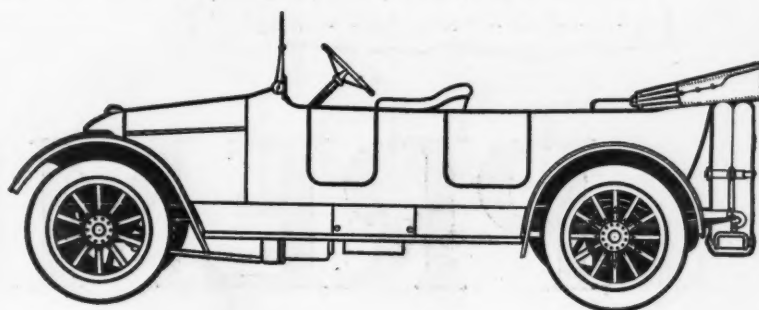
**The Premier reputation behind this car, and this** motor with its advantages in size and economy, form the greatest assets any dealer can have in the selling of motor cars in 1914.

**The Premier with the Weidely was the New York** Show feature. All of New York came to examine it. All were astounded at its unique *simplicity*.

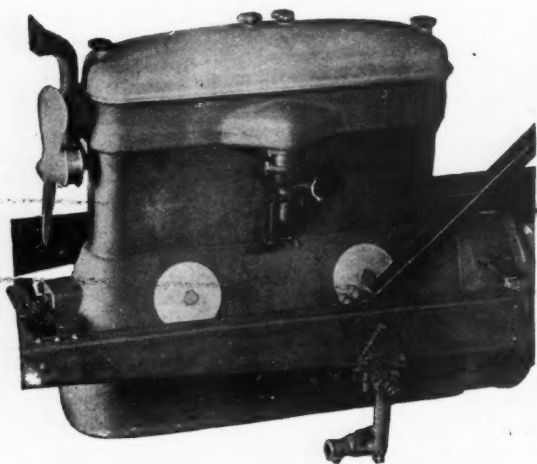
**The question now is, do you wish to handle in 1914** a car with the above features or would you have such a car on the floor of your competitor? Note the *lines* of these cars—the snappy style—the *advancement*. Here's a car that no man can choose against his wife's wishes, for here is the *beauty* and *style* that *she* wants. Don't make any contracts for 1914 until you've had the Premier proposition in detail. Send for details.

*The Weidely Motor cannot be had in any other American car.*

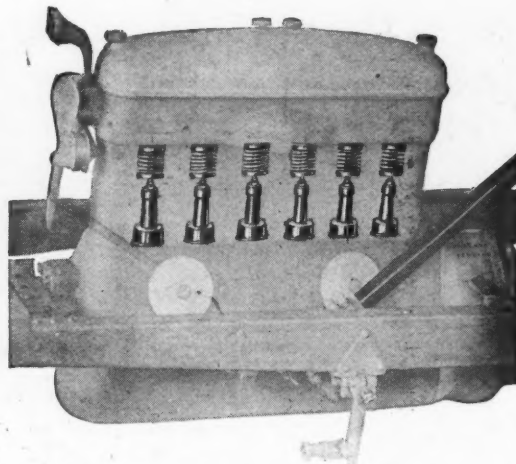
**Premier Motor  
Manufacturing Co.  
Indianapolis, Indiana**







Note the simplicity of the Weidely motor. All the valve mechanism localized on the head of the motor, directly over the cylinders. All perfectly lubricated. Short direct action. No cumbersome parts—no power wasted.



Valve mechanism of the ordinary motor—just the same on the other side, to say nothing of the multiplicity of gears vitally essential to the operation of the other motor. All eliminated by Weidely. Think of the wasted power.

## Reprint—Motor World—Jan. 8, 1914 New York Show Comment

### Premier-Weidely Motor "Sensation."

There remains only one other block-cast "six" among the new cars that are making their debut, and that one is unlike anything else either at this show or at any other show. It is, in short, the sensational Premier-Weidely motor, which reveals the altogether unusual combination of block-cast cylinders, overhead valves and a detachable cylinder head. As was made plain in the Before Shows Issue of Motor World, these three features are its most distinctive marks, as if any two alone would not be sufficient. In the flesh, or, rather, in the metal, the Weidely motor is even more impressive than it is on paper, for no amount of description can serve to convey to the average mind the really marvellous simplicity of the motor; with the neat aluminum housing over the single camshaft and its worm-actuating gear at the top, there is not a single moving part in view, with the exception of the magneto shaft, of course. The valves are all covered, as a matter of course, and the clutch and gearset are contained in

a solid housing which bolts closely to the crankcase of the engine. Even manifolds have been done away with—in fact, it is difficult to conceive of a more completely enclosed and compact power plant. The dimensions of the motor are  $3\frac{3}{4} \times 5\frac{1}{4}$  inches, though the mere figures scarcely are any indication of the power it is capable of generating. As for the rest of the chassis in which the engine is exhibited, it differs scarcely at all from the standard Premier chassis, in which there has been found very little room for improvement. There are other Premier cars on exhibition, of course, a touring car and a fast-looking roadster, but neither has the power to distract the attention of those who see the Weidely motor first.

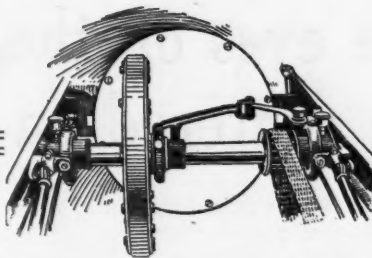
We make no claims to the supernatural. We cannot get more power out of a gallon of gasoline than it contains. Our economy is effected by efficiency. The difference between what we get and what the other fellow gets is what he wastes.

# PREMIER



# LAMBERT Gearless Motor Cars

The LAMBERT  
Gearless  
Transmission



14th Year  
of Success

## Mechanical Troubles Increase in Direct Ratio to Number of Parts Employed

Paint, varnish, and nickel trimmings, like beautiful clothes and pretty faces, are nice to look at, but the vital things in motor cars as in human beings are the heart, lungs and muscles—the motor and transmission.



Are they strong and able to do the work? These are the factors you would consider in hiring a man to shovel coal or work in the harvest field.

## What About the Heart, Lungs and Muscles in your car?

### Model 46, Series C

Completely Equipped  
Continental 30 H.P. Motor  
Electric Lights and Starter  
112" Wheel Base, Etc.

**\$1200**

Send for Catalogs

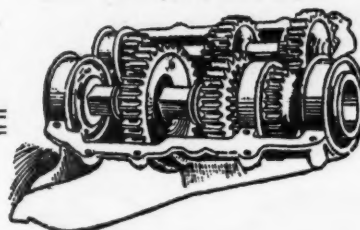
Touring Cars and  
Roadsters  
\$950      \$1600

An Interesting  
Agency  
Proposition  
for the Right Man

Why not select your motor car from this same level-headed standpoint?

The Lambert Gearless transmission eliminates expensive, clumsy, unmechanical, racket-producing gear sets, which having reached the limit of their development, are still far from perfect. The present tendency to pile on so-called improvements on the sliding gear transmission in the form of *electric and pneumatic speed changing devices* only afford greater proof of its weakness.

The finish, upholstery, trimmings, and equipment of all Lambert cars are unusually good. The long, full elliptic springs, and roomy, comfortable seats, make riding in this motor car a real pleasure.



The Complicated  
Sliding Gear  
Transmission

**The Buckeye Manufacturing Co.**  
154 Columbus Avenue, Anderson, Indiana



## The eyes of the entire motoring world are centered on the

For years the possibilities of a new type of motor employing neither poppet nor sleeve valves has been hinted at. Many hopes of such a motor have arisen from time to time, but in almost every case they proved false alarms and died aborning. Here in the Speedwell Rotary Valve Motor is at last the realization of motorists' dreams—

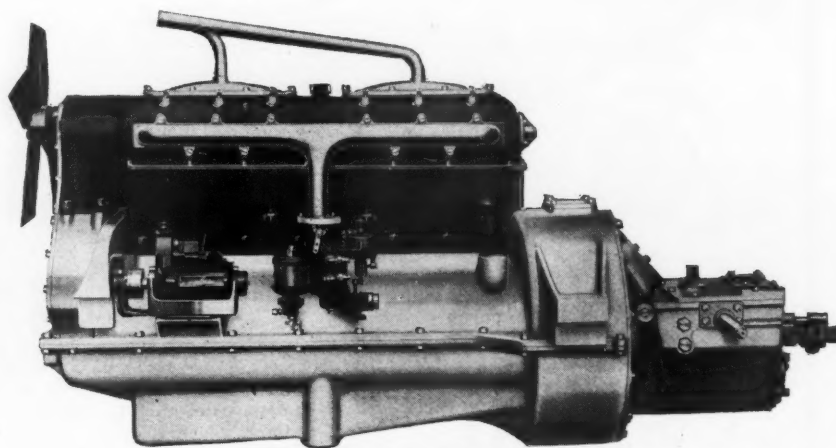
- a motor without poppet or sleeve valves—
- a simpler motor—
- a more powerful motor—
- a higher speed motor—
- a motor of longer life—
- a motor of absolute valve silence—
- a motor without vibration even at extreme high speeds.



This motor is unlike any other, is perfect and precise in its action and so simple that the wonder is that its introduction and perfection should have been postponed so long.

### Seven Years Spent in Thorough Test and Development

For seven years we have been working on this motor—developing it, testing it out on the road, always sure its principle was right but seeking by refinement of details to bring it up to a point of highest efficiency. We appreciated how radical and revolutionary our action in bringing out a new type of motor would be regarded and we knew it would be fatal to market this wonderful power plant until every last detail had been perfected and refined and O. K.'d by abnormally long, hard tests on the road.



SPEEDWELL ROTARY SIX MOTOR

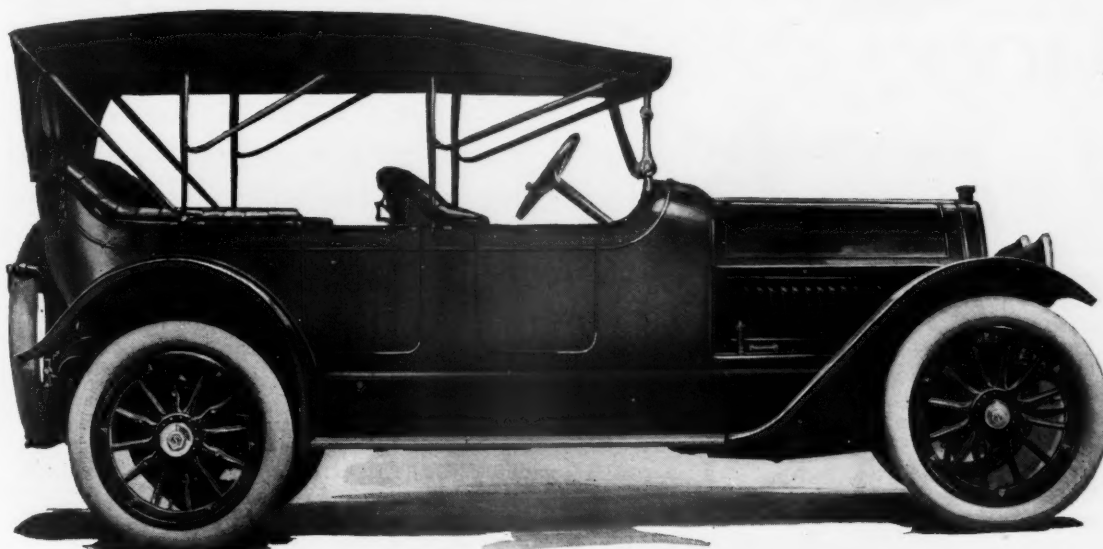
### Speedwell Rotary Deliveries Started January 1st

The time of the Speedwell Rotary has arrived. It is right in every detail. Deliveries of cars driven by this six-cylinder rotary valve motor started January 1st. The pity is that we can make so comparatively few of these Speedwell Rotary Sixes the first season. Speedwell dealers who have been at the factory and driven this Speedwell Rotary have gone home bubbling over with enthusiasm.

### Over Two Thirds of Output Already Sold

What has been the result of this dealer enthusiasm? They have told their customers about the motor and within the few weeks past, since we showed this motor to a portion of our own dealers they have sent us definite orders and delivery dates for two-thirds of all the cars we can build this season. The remainder of our output will no doubt be sold in a very brief period. We want these remaining cars well distributed throughout the country and will contract with a few more dealers in unassigned territory.





5 PASSENGER SPEEDWELL ROTARY SIX, \$2850—7 PASSENGER, \$2950

### Brief Specifications and Equipment of SPEEDWELL ROTARY SIX

Speedwell Rotary Six Motor—bore 4 1/4 inches, stroke 5 1/4 inches; in unit with dry disc clutch and selective sliding transmission; mounted on three-point suspension.

135-inch wheelbase.

36x4 1/2-inch tires all around on five-passenger, 37x5-inch tires all around on seven passenger.

Wagner electric starting and lighting system.

Dual ignition independent of starting and lighting.

Timken axles front and rear.

Pressure gasoline feed with 5-gallon reserve compartment.

The standard equipment furnished is complete and of uniform excellence. Mentioning the more important items in addition to those referred to above are—glass front, electric horn, Warner speedometer, top and top cover, engine-driven tire pump, tire carriers, demountable rims, gear shift lever lock, a full complement of tools, etc., etc.

### To Car Buyers and Dealers

To car buyer and dealer alike, we say—if you are interested in this remarkable motor it behooves you to act at once. Once you learn all the wonderful facts about it, once you see it running you will become enthusiastic like all the rest who have seen it.

### Get Speedwell Rotary Literature

Whether or not you can this season own a Speedwell Rotary Six depends upon your quickness to investigate and act—but whether or not you are too late, we want you to know all about this motor. We will gladly send literature upon request. We can't adequately describe this motor in this announcement—limited space cannot do it justice.

**The Speedwell Rotary Six Will Be Exhibited at Chicago Show**

**The Speedwell Motor Car Co.**  
Dept. M, Dayton, Ohio

### A Few Facts About The Speedwell Rotary Valve Motor

The primary advantages of this motor are silence, simplicity, freedom from valve wear and absence of vibration.

Its theoretically perfect combustion chamber form tends to increase power, decrease gasoline consumption, and avoids carbon deposit. The high efficiency is aided as well by the straight passage of gases into and out of the combustion chamber.

There are no reciprocating parts in the valve construction—rotation is continuous in one direction at one-quarter crank shaft speed.

Not only is the motor capable of developing high power but attains and maintains extremely high speeds without vibration.

The motor retains its initial efficiency because there is practically no valve wear and the valves cannot get out of time.

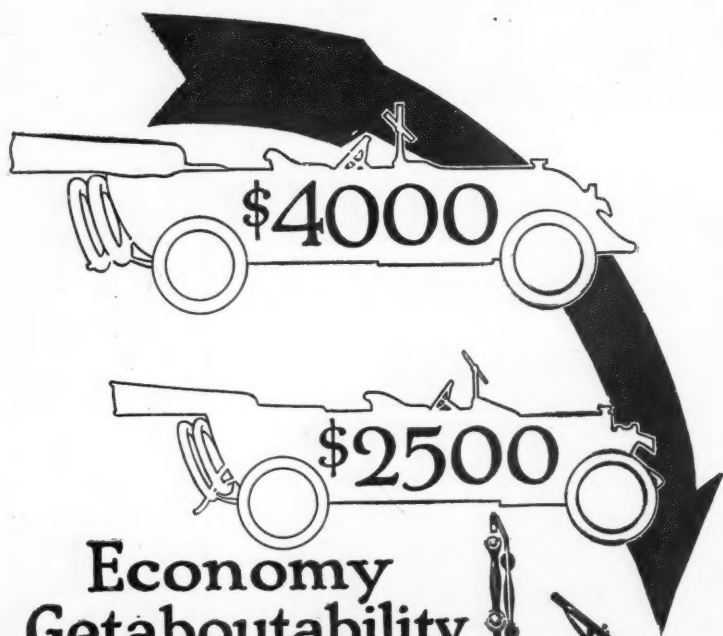
The rotary valves are lubricated automatically by oil pumps with direct feeds, the volume of oil being controlled by the throttle opening.

The motor continues to rise in power as the speed increases to a much higher limit than the limit of poppet valve motors.





# Going Down for Economy



Here is a graphic demonstration for the owner of big, heavy high priced cars. He is finding out that big motors mean terrific expense. Where is the remedy? Less size, less weight. Less consumption of oil and gas. Still the upkeep is too high. He has saved a thousand dollars or so on first cost but he is still behind.



Jeffery Four \$1550



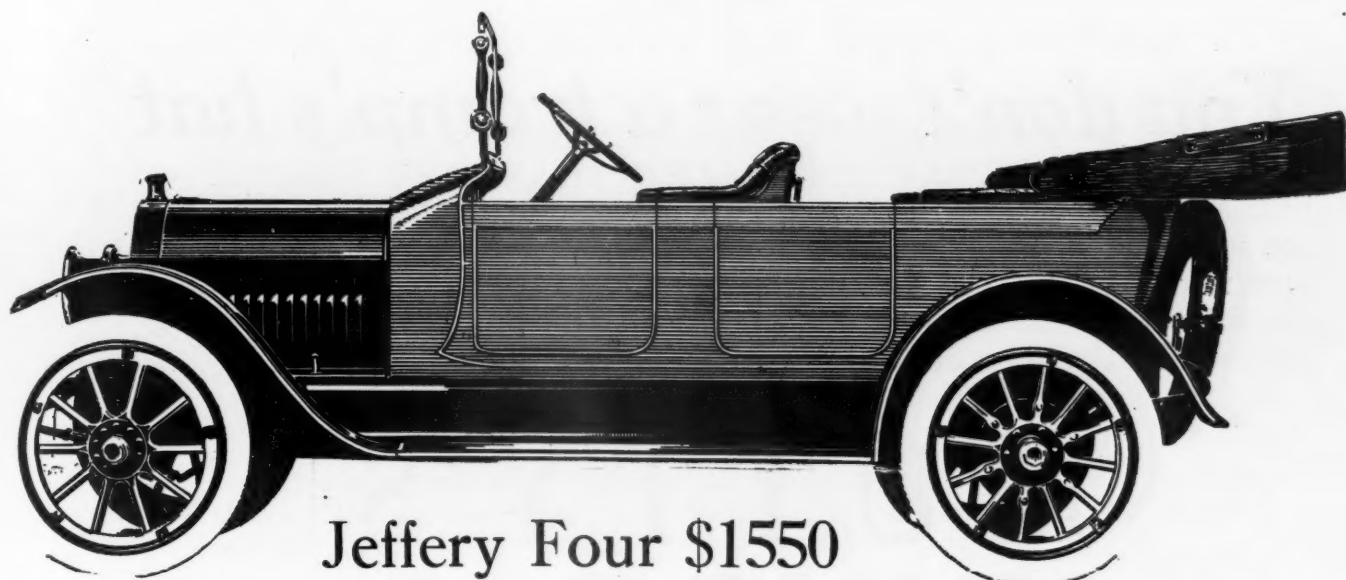
The next step for that man is the new Jeffery Four at \$1550. In building this car we have accomplished what no other builder has succeeded in doing. We have kept the power, the speed, the "class" that the big car man had to have. But we have used the new light European style bloc-type motor—all the engine power he wants, without the loss of any style or prestige. The Jeffery is a beautiful car; it is absolutely high grade, it is comfort itself. It is the car you will certainly select for both quality and economy.

*When Writing to Advertisers, Please Mention Motor Age.*



# Going Up for Comfort and Style

And here is the way out for the man who has always considered economy. There are thousands of men like that. They're the larger part of the motor buying public. In order to get the low price these men have had to put up with discomfort, with partial satisfaction. They've had to apologize for cars that didn't cost enough, because the next step was a car that cost too much.



Jeffery Four \$1550

Now comes the Jeffery Four at \$1550. This is the first really high grade car offered at a moderate price. It is powerful, economical and—above all—comfortable. It has the "looks." Its motor and its body design are two years ahead. The Jeffery comes down to the right price and takes the buyer up where he wants to be. It takes him past the cars that are too light to be reliable, cars that cannot use high-grade materials at their selling price. It gives him a real car; as good in its essentials as any car made.

*Get the Jeffery Circle; see how this is done.*

**Comfort  
Appearance  
Quality**



**The Thomas B. Jeffery Company**  
Main Office and Works, Kenosha, Wisconsin

When Writing to Advertisers, Please Mention Motor Age.





## *You don't wear a tramp's hat*

with a frock coat. Ever notice how many expensive automobiles you see with faded, stretched, sagging, shabby tops? That's because car buyers, car sellers and car makers overlook, for one reason or another, the importance of Top Materials. Now isn't it time the "any-old-thing-for-top-cloth" died a natural death?

# MUTTY'S NUMOTOR

Auto Top and Seat Cover Fabrics are **smart, substantial and durable!** They have real **class**—they come in various weights and shades—they are **absolutely water-proof**, also **wear-proof** and they don't fade because they are "fibre dyed" with **Indanthrene dye**. Give this top and seat fabric some attention. You'll get gratifying results. Ask to see samples of "Mutt's Numotor!"

Our line of **mohair fabrics**, **auto leathers**, and **auto rubber cloths** is the largest and most complete that has ever been shown.

---

**L. J. MUTTY CO., Boston, Mass.**



**A**T Show time as at no other time, parts and accessories for motor cars can be compared, and by observation and inquiry the accepted standards are ascertained.

The popularity of an automobile depends in great measure upon the completeness of its equipment, but not only the completeness—the equipment must be complete and of Standard Accessories.

Investigation among the cars on exhibition will prove the

## **Four Cylinder KELLOGG Tire Pump**

to be the Standard Power Driven Tire Pump

**PACKARD, PEERLESS, STEVENS-DURYEA, WINTON, LOZIER, FRANKLIN, CHALMERS, HAVERS, STEARNS**

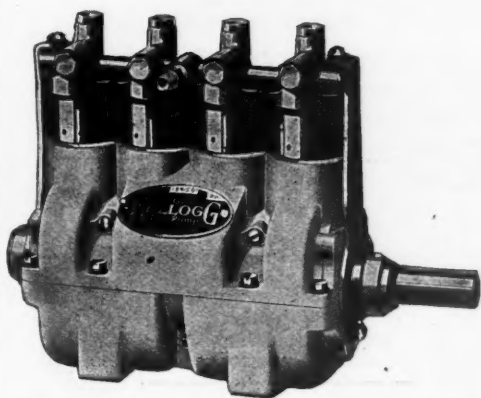
and others, examples of the very best in motor cars, are equipped with the Kellogg Pumps exclusively as Regular or as Special Equipment, and have been in the past—some for five years! These manufacturers make practically all the parts of their cars themselves, and in the purchase of a Kellogg Pump they standardize it, and acknowledge it to be in perfect keeping with their car.

In the purchase of a motor car *insist* upon the Kellogg Pump Equipment. You are entitled to it.

In selecting a Power Pump for your present car purchase a Kellogg from your dealer. We have a complete list of attachments for equipping practically every make, and will be glad to send you booklet.

The same careful selection of material and painstaking workmanship necessary for the approval of a Four Cylinder Pump to the above manufacturers is used in the manufacture of all our other products, and in our **Self Starting System, Garage Pump and Hand Pumps** and other smaller accessories, you will find quality not found in other makes.

Write for literature, which we will be glad to send upon request.

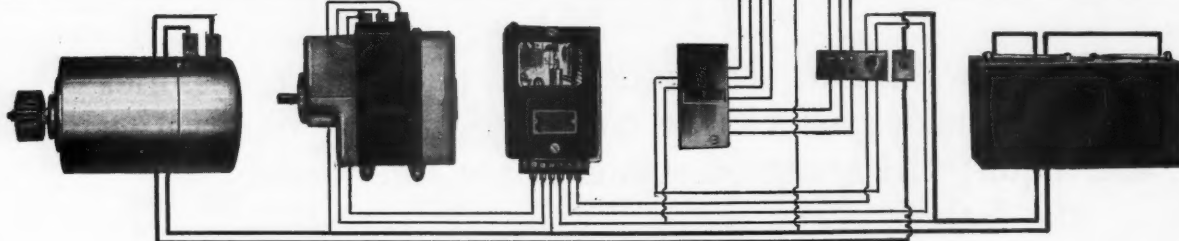


**Kellogg Manufacturing Co.**  
Rochester, N. Y.

NEW YORK  
1733 Broadway

CHICAGO  
1112 So. Michigan Avenue  
SAN FRANCISCO  
444 Market Street





## The Adams & Westlake Co.

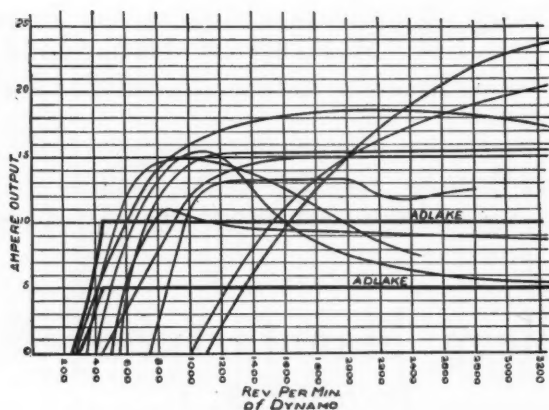
Established 1857

317 W. Ontario Street, Chicago

### The Adlake Starting Motor

**T**HE starting motor in the Adlake Automobile Electric Lighting and Starting System is a heavy duty type, designed to turn over the heaviest engine fast enough to insure satisfactory starting in cold weather, and at the same time make as little drain on the storage battery as possible in doing this work. Economy of current in a starting motor—in other words, maximum efficiency—is extremely desirable, as a motor taking its current from within the limits of a storage battery must make the best use of every bit of current it consumes.

The Adlake Starting Motor is in mesh with the engine only while it is being used as a starter and creates no "load" for the engine to carry while the car is running.



The curves on the left were plotted by a prominent user of the Adlake Automobile Lighting and Starting System in comparison with other systems.

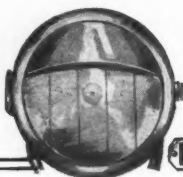
Lower curve—touring rate.  
Upper curve—night or winter rate.

**Note first,** that the Adlake Dynamo carries full load at the lowest R. P. M. (450 R. P. M.). This means that the dynamo can carry the full load of the lights when the car is making nine miles per hour in high.

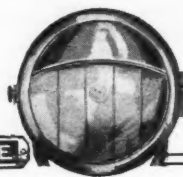
**Note second,** this flat output curve is the genuine characteristic of the Adlake Dynamo. The regulator sensitively varies resistance in series with the dynamo field, to compensate for every change in the speed of the engine. This characteristic flatness of the curve, insuring minimum variation of the strength of current, results in long life for the battery and for the lamps.



Low output  
at low speed means  
dead batteries



ADLAKE



High output  
at high speed means  
burnt batteries





# A Neverleek Top Adds to the Value of Any Car. It is the Standardized Top Covering



A Neverleek Top is not an accessory—it is a part of the car itself. How important a part it is, motor car manufacturers and motorists are realizing more and more every day.

Neverleek Top Covering is the first material scientifically constructed to meet the strenuous demands of automobile service. It is not a makeshift, not a fabric or imitation leather designed for carriage or upholstery use, but constructed especially for automobiles.

Neverleek holds its shape and appearance through long wear. It is not affected by sun's heat or zero cold. It won't stretch or sag. Constant folding does not harm it, and it is absolutely waterproof, and remains so. Read this

## UNLIMITED GUARANTEE

Neverleek Motor Top Covering is guaranteed absolutely waterproof, without time limit in any climate, under all circumstances. Any automobile dealer, anywhere, can, by writing us, arrange for the recovering of any Neverleek Top without expense to himself or his customer—provided such top leaks through the fabric.

No matter how good looking a car is—a Neverleek Top will make it handsomer. It is smart, rich-looking, distinctive, and its appearance is retained through long, hard service.

No matter how high priced a car is—a Neverleek Top will add to its selling value and to its service value.

No matter how popular a car is—a Neverleek Top will make it more desirable.

Many Manufacturers of Motor Cars have adopted Neverleek as standard equipment.

They will benefit from our national advertising, which will be continued aggressively to acquaint motorists and dealers everywhere with the advantages of Neverleek.

TRADE MARK

# NEVERLEEK

## TOP COVERING

*Guaranteed Without Limit*

is an advantage to the seller because it is an advantage to the buyer. If you are a seller of cars, ask for Neverleek Top Equipment. It gives you an additional selling argument—gives you the benefit of our strong national advertising.

If you are going to buy a car, specify a Neverleek Top. Your dealer will be glad to supply it as regular equipment.

Sample of Neverleek and full information on request.

We shall be glad to furnish the names of top makers who will replace or recover old tops with Neverleek.

# F. S. CARR COMPANY, Boston, Mass.

Factories at Framingham, Mass., and Tilbury, Ontario, Canada

*When Writing to Advertisers, Please Mention Motor Age.*



# Safe in the Grip of MULTIBESTOS

*The Brake Lining of Quality*



**Standard Woven Fabric Company**  
Framingham, Mass.

*When Writing to Advertisers, Please Mention Motor Age.*





## The Cadillac two-speed direct drive axle is accepted as the most progressive motor car development of the year

Press comment abroad and at home makes that perfectly clear

It Presages the trend of motor car engineering

### From "The Motor" (London)

WE have always held the Cadillac in the highest esteem, and admired it as a criterion example of high-grade American construction. The charm of the dual drive to the rear axle is compelling and entrancing, and as one merely touches the little lever at the side and, on depressing and allowing the clutch to rise, finds a higher direct drive available, wonderment is aroused as to the undoubtedly simple manner in which so great an advantage has been brought about.

The luxury of driving a touring car at 20 or 25 miles an hour with a direct drive and final gear ratio of 2.5 to 1 is quite a new fascination.

### From "Motor Age" (Chicago)

A DOPTION of the two-speed rear axle by one of the larger makers of motor cars for the coming season may be taken as a criterion of the efforts that are general throughout the industry toward easier maintenance. In this case, the ease of maintenance attained is indirect, but none the less present. The effect of doubling the number of speeds obtained in the gearing is believed to make for longer life of the motor since it need not be worked on a hard pull or made to turn over so rapidly at high car speeds. In other words, the increased flexibility of the power plant is expected to result in its greater useful life.

### From "Horseless Age" (N.Y.)

IT seems at least possible that the two-speed axle may confer upon the four-cylinder car sufficient flexibility and accelerative ability, without recourse to noisy geared speeds, to satisfy the public demand for these qualities, and if this should prove to be the case, the demand for six-cylinder cars, with their somewhat more costly, more bulky, more complicated and less economical motors, might be materially reduced. It can hardly be doubted that the advent of the double-direct drive is one of the most important happenings of recent years in the automobile industry.

It is the all-absorbing topic in American and European trade and engineering circles, and the second award of the Dewar Trophy to the Cadillac has accentuated the intense interest.

And these native and foreign engineers and editors are merely saying in technical terms what the first Cadillac owner you meet will tell you in much simpler language.

The owner of a new Cadillac—and more than 7500 of the new cars are now in operation—will tell you in blunt, plain English that he has never ridden in a car which compared with it.

He may not argue the merits of the two-speed direct drive principle.

He will simply say:

"Get in and ride with me and you will agree that you never experienced a sensation so much like floating through space."

And if you do ride, you will agree with him.

There have always been Cadillac owners, thousands of them, who would not concede for a moment that more money could buy a better car.

But there are thousands who go much further now.

They will not admit that any car is comparable in its riding qualities to this new Cadillac.

And there are other things as well which they will not admit.

Above all, they will not admit that there is a car which is comparable in those dominant characteristics which earned for the Cadillac the second award of the honor most sought by European makers—the Dewar Trophy.

That award stamped the Cadillac as possessing in the highest degree those qualities which make most for all around practicability, for day-in-and-day-out and year-in-and-year-out constancy, satisfaction and service in the hands of the every-day user.

### From "The Autocar" (London)

WHEN the Cadillac system of combining ignition, lighting, and engine starting in one electrical system was introduced two years ago, it was very properly regarded as a bold step, and it was certainly the most interesting innovation which had been made for a long time, while experience has shown it to be as successful as it was bold. To-day the Cadillac designers have made another innovation, which, personally, we regard as even a greater improvement than the very important one of two years ago.

After once experiencing the delight of two direct and noiseless drives one feels that it is difficult to outline an ideal car which does not contain this feature, and we feel fairly safe in asserting that the Cadillac successful reintroduction of an old idea will be followed by other makers.

CADILLAC MOTOR CAR CO., DETROIT, MICH.

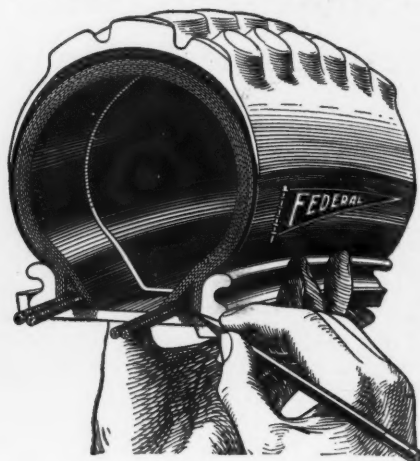
When Writing to Advertisers, Please Mention Motor Age.



# This New Construction fortifies you against tire troubles

THE Federal Double-Cable-Base is a new and original principle of tire construction that certainly commands the attention of the entire automobile industry. It embodies features that remove the troubles that are the greatest sources of expense to tire buyers—destructive factors that are responsible for the ruination of over two-thirds of all tires sold.

No More Sidewall Breaks  
No More Rim Cuts  
No More Pinched Tubes  
No More Tire Blow Offs



Federal Double-Cable-Base Tires have been tested out for eight months—(50,000 of them) without a complaint. This new principle of tire construction is admittedly the greatest stride ever made in the pneumatic tire industry. Federal Tires fortify you against the most serious and expensive tire troubles. With this construction—

**Side Wall Breaks Cannot Occur**—Because the flexible bead-filler permits full and easy flexing of the side walls at point of contact with side rings.

**Rim Cutting is Entirely Absent**—Because the strong but pliable filler with elastic point is substituted for the commonly used hard, sharp, unyielding bead-filler.

**Tire Cannot Blow From The Rim**—Because the double endless cables cannot work away from the anchorage or stretch under the severest strain.

**Tube Pinching is Eliminated**—Because there is perfect "heel and toe" anchorage. The base is so firmly held to the rim that it cannot lift and pinch the tube.

The Double-Cable-Base construction is exclusively found in Federal Round and Rugged Tread Tires of the Quick-Detachable Clincher and Straight Wall types and they cost no more than tires without this great improvement.

Call on any Federal Dealer and ask him to explain how the features of Federal Double-Cable-Base Tires overcome serious tire trouble and save you money.

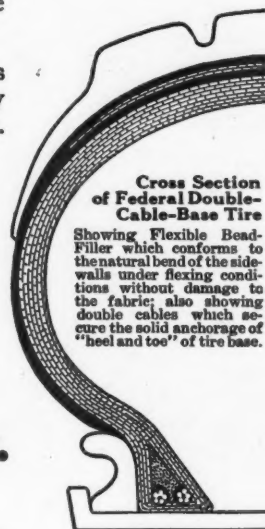
**Federal Rubber Mfg. Co.**  
Milwaukee

Branches, Service Stations and Distributors Everywhere



**Cross Section of Tire with Hard Bead-Filler**

Showing position of tire on rim while in service; how the Hard Bead-Filler remains stiff and unyielding while the tire is forced outward against the side ring, and how the sharp point of the hard bead cuts and ruins the side-wall fabric.



**Cross Section of Federal Double-Cable-Base Tire**

Showing Flexible Bead-Filler which conforms to the natural bend of the side-walls under flexing conditions without damage to the fabric; also showing double cables which secure the solid anchorage of "heel and toe" of tire base.



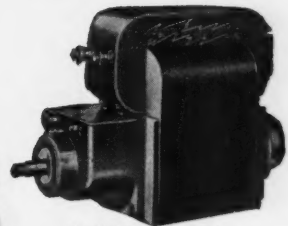


## AUTO-LITE ELECTRIC STARTING and LIGHTING SYSTEM

"As Sure as the Whirl of the World"

### Protected

Auto-Lite Starting and Lighting Systems are so compactly enclosed that water, dirt and grease cannot injure them.



Model G Generator  
Type S. R. 4

### Powerful

They are designed to more than meet the demands made on them for light and power. This reserve always gives the owner a conscious feeling of safety and satisfaction.

### Positive

A knowledge of what constitutes correct design, combined with years of experience in the manufacture of electrical apparatus for motor cars have made the Auto-Lite Systems trustworthy and positive in operation.

In a crisis, they can always be depended upon to perform their functions faithfully and fully.

You will find our technical literature very valuable. Send 10c in stamps for our book on Automobile Electric Systems. Regular price 50 cents.



Starting Motor

## The Electric Auto-Lite Company

"The Pioneer Makers of the 6-volt Electric System."

TOLEDO, OHIO

Branches:

NEW YORK

DETROIT

KANSAS CITY

SAN FRANCISCO

When Writing to Advertisers, Please Mention Motor Age.





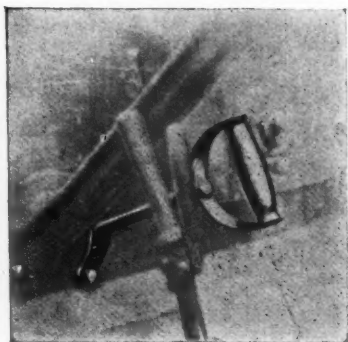
# BOSTON STARTER

CRANKING will be robbed of all its terrors this coming winter if your FORD CAR is equipped with a BOSTON STARTER. What a relief it will be to get into the seat—pull the handle of your BOSTON STARTER—and instantly hear the welcome response of the motor!

The BOSTON STARTER is purely a mechanical device; it has all the power of acetylene or electric starters **without** their annoyance and expense; there is nothing to get out of order; its parts are few, simple, and strong. The entire device is beneath the hood, except the handle, which is located on on the dash.

The BOSTON STARTER was designed particularly for your FORD CAR and is just the thing to make it even **more convenient, more useful, and more easily operated.**

See the BOSTON STARTER at our nearest representative's or write for literature.



**Automatic Appliance Company**  
172 Columbus Avenue Boston, Mass.

#### Distributed by

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4529 Park Heights Ave.  
CHICAGO, ILL.,  
Ford Supply Company,  
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# NORTHWAY'S MOTOR CAR



OHIO ON  
THE MAP

## STANDARD OF THE WORLD

The Wise Ones Choose  
The Crescent

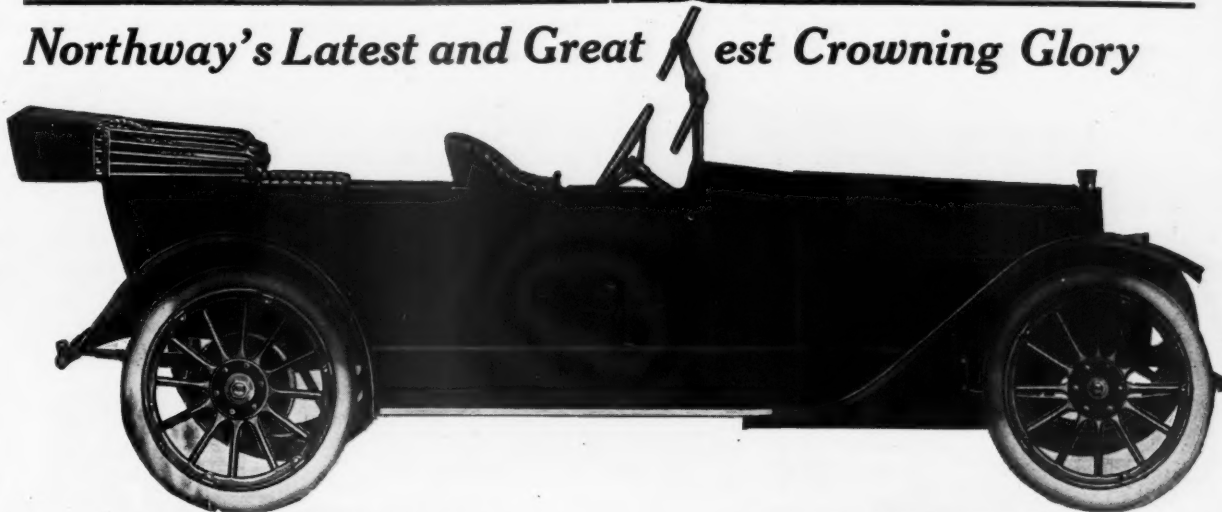
(Motor Co.'s)

### Royal Ohio Models

The Crescent joins together Northway's manufacturing plant with Paxson's selling organization. Time's noblest offspring is the latest. This is Northway's latest.

After years of experience, exhaustive tests and expensive experiments, the greatest of all designers and inventors, Mr. R. E. Northway, the founder of the Northway Motor Co. and original designer of that now famous motor, which is acknowledged by the best engineers and experts to be the greatest motor in the world, now brings out his latest and greatest of all motors, to be used exclusively by the Crescent Motor Co. of Cincinnati, O.

## Northway's Latest and Greatest Crowning Glory



### ROYAL MODEL, \$1,985

MOTOR—Six-cylinder, 4 x 6.  
AXLE—Full floating on annular bearings.  
TRANSMISSION—Four speeds ahead and one reverse.  
CLUTCH—Multiple disc.  
CONTROL—Center and left hand drive.  
SPEEDOMETER—Warner, flush.  
TIRES—35 x 4½ and 36 x 4.  
WHEEL BASE—132 inches.  
ELECTRIC STARTER, LIGHTS and HORN.  
RIMS—Demountable.

### OHIO MODEL, \$1,275

MOTOR—Four-cylinder, 4¼ x 4¾.  
AXLE—Floating on Roller Bearings.  
TRANSMISSION—Three speeds ahead and reverse.  
CLUTCH—Multiple disc.  
CONTROL—Center.  
SPEEDOMETER—Stewart.  
TIRES—34 x 4.  
WHEEL BASE—116 inches.  
ELECTRIC STARTER, LIGHTS and HORN.  
RIMS—Demountable.

We are now ready to contract with good, reliable, live, wide-awake dealers and distributors on this greatest of all lines

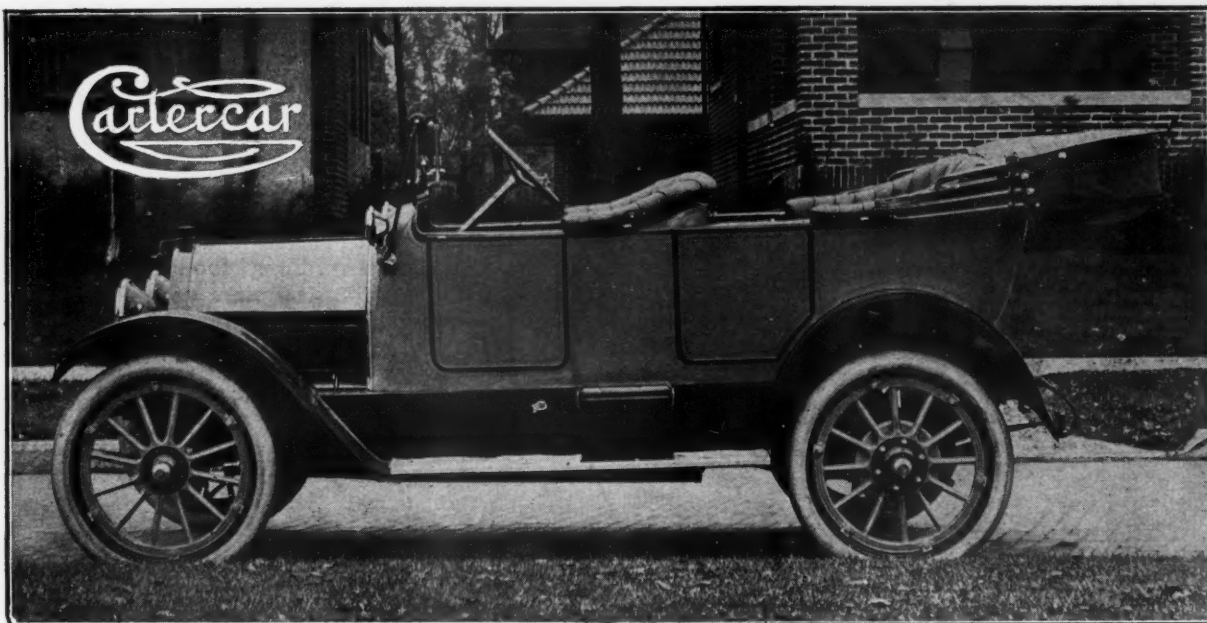
## THE CRESCENT MOTOR COMPANY

C. D. PAXSON, Gen. Sales Mgr.  
1900 Euclid Ave., Cleveland, O.

W. T. HUNTER, Pres., Cincinnati, Ohio  
BELLAMORE & TOOMEY, Export, 10 Bridge St., New York City



# Here's a New Cartercar, Price \$1250



This new Cartercar at a new price, \$1,250, possesses all the proven qualities of, and comes fully up to the high standard set by the other Cartercars.

It has the simple two-unit patent Cartercar drive system, the world famed "gearless transmission." This consists of a disk shaft and friction wheel and the silent chain-in-oil secondary drive. The disk and wheel roll gently together to set the car in motion, thus eliminating the usual clutch with its rasping clash and jerky starting.

This Famous Gearless Transmission with its

many speeds and one-lever control is backed by the powerful four cylinder, five inch stroke motor, operating silently, because all valves are inclosed.

There is nothing lacking in the equipment of the Model 7. It has all that is needed to successfully operate it, including electric lighting and starting, demountable rims with one extra, silk mohair top, full set side curtains, tools, license brackets, etc.

When attending the automobile shows do not fail to see Model 7, and ask for a demonstration.

We are anxious to have you ride in it.

## Winter Driving in these Cartercars Means Luxury Without Extravagance

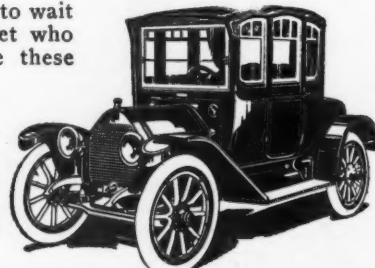


Model 5D Colonial Sedan, Fully Equipped, \$2,000

People who travel in winter—those who do not like to wait for the more tedious methods of conveyance and yet who dread the rigors of open automobiling, should see these superb Cartercar Colonial Models, the Sedan and the Coupe.

Step inside. You will see deep upholstery in leather and dark blue broadcloth, silk curtains, blue seaming lace, sashed in rich San Domingo mahogany, windows in best French plate, electric dome light in ceiling, etc.

All these features you would enjoy, together with the gearless transmission, without paying a fancy price. No need to spend \$5000. Buy a Cartercar.



Model 5C Colonial Coupe, Fully Equipped, \$1900

All Models are Fully Described in Our New Catalogue

# Cartercar Company

Pontiac, Michigan

Branches at: New York

Chicago

Detroit

Kansas City

Atlanta

When Writing to Advertisers, Please Mention Motor Age.





"Here are the General Offices and Works of The Electric Storage Battery Co.—the largest storage battery plant in the country."

## POWER FOR STARTING AUTOMOBILE ENGINES AND ELECTRIC LIGHTING

To start an automobile engine requires power—lots of it—especially in cold weather.

The real reason why electric starting and lighting apparatus has been so wonderfully reliable and is being almost universally adopted is because the storage battery has proved itself to be the most useful and efficient reservoir of energy for this purpose.

To crank an engine, a storage battery must develop from one-half to one horse power for a few seconds or minutes.

To light the lamps, it must develop about one-fifteenth horse-power for 8 to 15 hours without recharging.

It must receive and utilize the energy delivered it by the generator without waste. It must do its work, month in and month out, at temperatures ranging from below zero to 100° F.—instantly, automatically and cheerfully. It must demand (because it will receive) less care and attention than engine, gear box or any other vital part of the car.

## THE "Exide" STARTING & LIGHTING BATTERY

has been designed and constructed with a thorough knowledge of the varied character of the work it must do. It is made by a company that has had 25 years of experience in storage battery manufacture, covering every field in which storage batteries are used.

This company manufactures and has manufactured more storage batteries than all other makers put together. Two out of every three automobiles using electric self-starting and lighting apparatus are equipped with an "Exide" Battery. There are over 100,000 "Exide" Batteries now in service used for starting, lighting or ignition.

For electric vehicle propulsion "Exide" Batteries have for years been the standard among nearly all electric vehicle manufacturers and are to-day used by the largest electric vehicle owners. The large electric lighting companies use "Exide" Batteries as reservoirs of current for use in emergencies. They

are used by the U. S. Government in 20 submarines, for firing large guns, for light-ships, for electric vehicles and for wireless apparatus. In New York City 182 storage battery street cars are propelled by "Exide" Batteries.

Unless you are a trained engineer, you cannot safely judge of the quality of a storage battery. Your best protection is to select a battery that is manufactured by a company having the necessary experience and facilities and a battery that has been approved by large battery users—those who are experts.

Your car is or will no doubt be equipped for electric self-starting and lighting.

**Remember, the Storage Battery is the "Heart" of the System.**

You can be absolutely assured of dependable every-day service by using the "Exide" Battery. Insist upon the "Exide". Your dealer can secure it if you insist.

## THE ELECTRIC STORAGE BATTERY CO.

New York  
St. Louis

Boston  
Cleveland

Chicago  
Atlanta  
886 "Exide" Distributors

Detroit

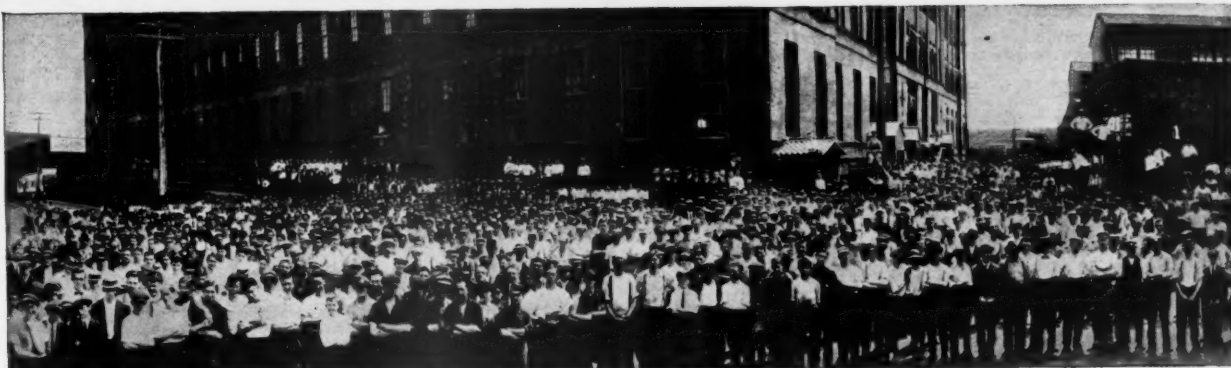
PHILADELPHIA, PA.

1888-1914  
9 "Exide" Depots

Denver  
Los Angeles  
"Exide" Inspection Corps

San Francisco  
Portland, Ore.

Seattle  
Toronto



Noon Hour at the Factory—One of the factory buildings and a part of the employees of the Company

When Writing to Advertisers, Please Mention Motor Age.



# Least Expensive In the Long Run

## Cleveland-Canton Automobile Springs

One broken spring will cost you in money, delay and annoyance far more than GOOD springs would have cost originally.

The amazing strength and toughness put into Cleveland-Canton Chrome-Vanadium springs is due to the process by which they are made.

Instead of a single rolling, Cleveland-

Canton Chrome-Vanadium Springs are cross-rolled, both *lengthwise* and *crosswise*.

This method, steel experts will tell you, cannot be improved upon in making automobile springs.

### Cross-Rolled Chrome-Vanadium

"Not a  
Bump in  
One of  
Them"



"Built for  
Life-Long  
Endurance"

Don't be satisfied with ordinary springs, when you can get springs of such enduring quality as these.

Springs which shield the engine from shock and vibration, springs which make the car last longer, springs which

reduce the upkeep in a way you can trace.

Leading makers are using these springs by the thousands. You can learn all about them, if you write for our booklets and full information. Why not today?

Best Grade—Chrome-Vanadium  
Next Best—Special Analysis

**The Cleveland-Canton Spring Co.**  
Canton, Ohio, U. S. A.



*When Writing to Advertisers, Please Mention Motor Age.*

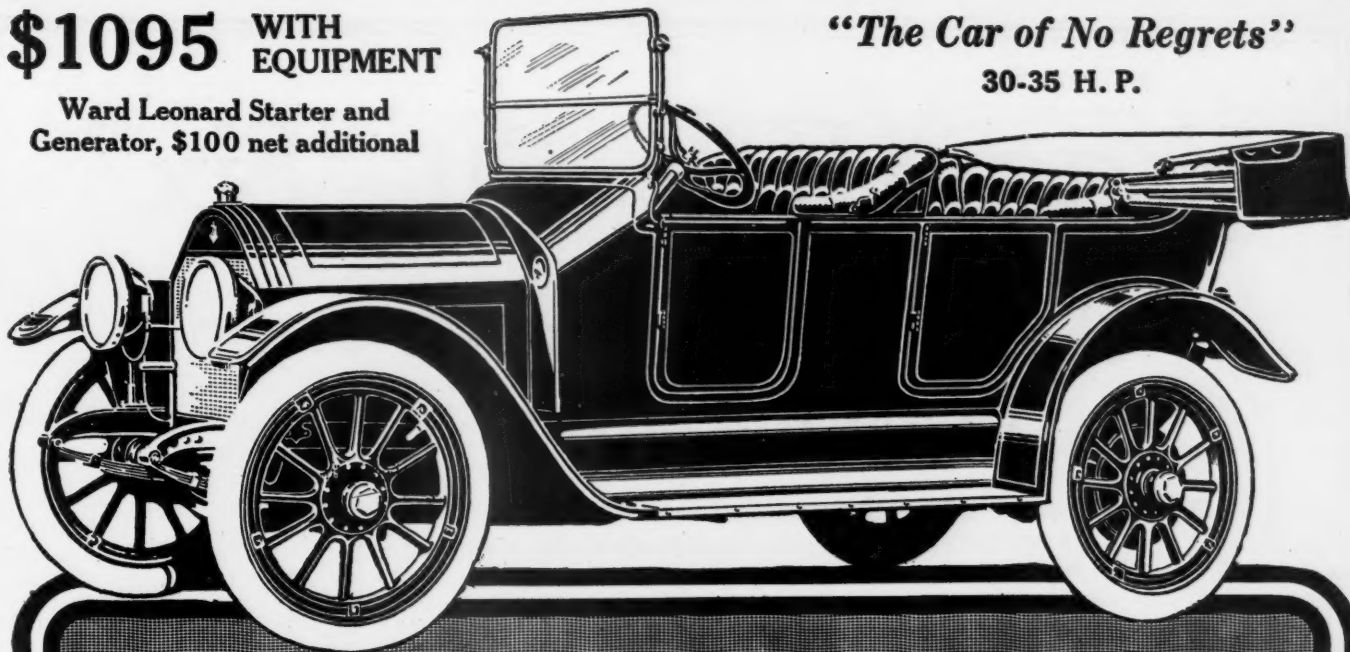


**\$1095 WITH EQUIPMENT**

Ward Leonard Starter and Generator, \$100 net additional

**"The Car of No Regrets"**

30-35 H. P.



# KING

## Only Dealers of Proved Ability Need Apply for KING Agencies

We cannot afford to place our car in the hands of an agent who lacks the experience to properly represent it, and thereby risk the KING'S reputation in a community. Reliable dealers are invited to consider the following five points:

- I. The KING MOTOR CAR COMPANY sells no stock, and pays cash on all purchases. It reserves for itself only a small fixed profit, returning the balance of its earnings for the betterment of its car.
- II. The KING gives greater value in features, power, style, comfort, durability, economy of operation, and equipment, than is elsewhere offered at near price.
- III. Our car has a solid, refined appearance, and its vital parts are made by the same specialists who
- IV. manufacture for the most expensive cars. The KING is distinguished by a cantilever rear suspension of proved superiority, which makes shock-absorbers unnecessary.
- IV. Our "one chassis" policy means the concentration of the entire organization upon the production of one perfect unit of valve-running mechanism.
- V. Our selling proposition is liberal, we make prompt deliveries, and our advertising is generous and far-reaching.

If you can meet the KING'S requirements, the KING can meet yours—as it will prove to be everything you could desire in a car of its class.

**KING MOTOR CAR COMPANY, 1300-1324 JEFFERSON AVE. DETROIT, MICH.**

New York Agency and Showroom, Broadway at 52nd Street



# KISSELKAR 60 "Six"

## The car that eliminates every reason for paying more

No matter what its selling price may be, no car can show a more consistent record of performance and satisfaction than the KisselKar 60 "Six"—completely equipped at \$3150. Beauty, comfort, convenience, simplicity and stamina are embodied in this splendid car to a superlative degree.

Long, low, rakish and graceful in an individual way; stream lines; foreign design front axle; octagon Solar lamps; crowned fenders; clean running boards. *That's beauty.*

The most successful electric self-starter—our own—operated by a foot plunger; starting, lighting and ignition in separate units; four speed transmission, affording widest range of throttle control; cone leather faced clutch; left hand drive, center control. *That's simplicity.*

Big, roomy compartments, both front and rear; deepest and finest upholstery; correctly tilted "Commodite" seats; 142 inch wheel base;

56 x 2½ inch rear springs; 37 x 5 inch oversized tires; shock absorbers. *That's comfort.*

A 4½ inch x 5¼ inch Kissel Motor, cylinders cast in pairs and giving sixty horse power on brake test; power plant on independent sub-frame; 5½ inch frame, 4 crank shaft bearings; brakes of the highest efficiency. *That's stamina.*

These are but a few of the features of this car which for six years has carried KisselKar prestige to every corner of the continent and across the seas.

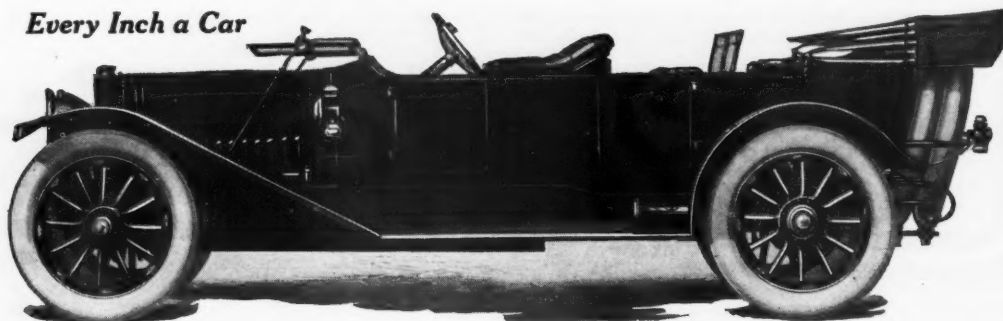
There are two other KisselKar touring models, a remarkable smaller "Six" at \$2350 and a wonderful "Four" at \$1850. Runabout, Sedan, Berline and Limousine bodies on all chassis.

Write for your copy of illustrated portfolio. It's ready.

**Kissel Motor Car Company, 121 Kissel Avenue, Hartford, Wis.**

BOSTON, NEW YORK, CHICAGO, MILWAUKEE, KANSAS CITY, MINNEAPOLIS, ST. PAUL, DALLAS, SAN FRANCISCO, LOS ANGELES, OAKLAND, Philadelphia, Detroit, Houston, El Paso, New Orleans, Washington, Baltimore, Nashville, Duluth, Buffalo, Pittsburgh, Hartford, Conn.; New Haven, Albany, Troy, Rochester, Providence, St. Louis, Marshalltown, Iowa; Omaha, Hastings, Neb.; Madison, Montreal, Quebec, Toronto, Winnipeg, Calgary, and 300 other principal points throughout America.

*Every Inch a Car*



*When Writing to Advertisers, Please Mention Motor Age.*



# The Automatic Varnish Drying System

is used and endorsed by

These and numerous other motor car companies are using The Automatic Varnish Drying System because

- it produces a better finish than can be made any other way without it.
- it reduces the time required for finishing.
- it releases capital from the investment in goods being manufactured.
- it makes for great saving in the amount of floor space required.
- it maintains the established working schedule at all seasons, irrespective of atmospheric conditions.

We are the *originators* of rapid varnish drying—the only real *specialists* in our field. Our wide experience in solving the drying problems of the leading American motor car companies, qualifies us, as nothing else can, to solve *your* drying problems.

Our Engineering Department will figure on your requirements, *gratis*. Write us.

**Wenborne-Karpen Dryer Company**  
910 So. Michigan Ave., Chicago, Illinois

Packard

Buick

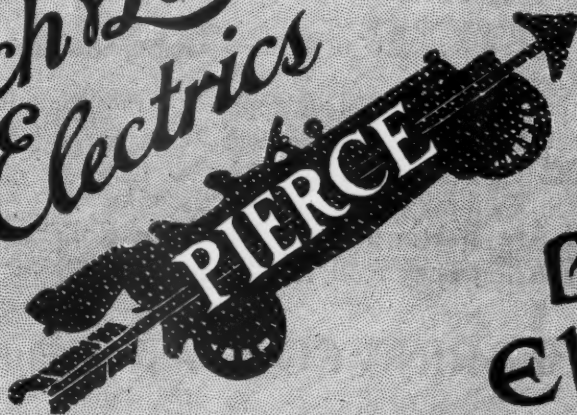
Chalmers

Peerless

Cadillac

Speedwell

Rauch & Lang  
Electrics



Oakland  
"The Car with a Conscience"

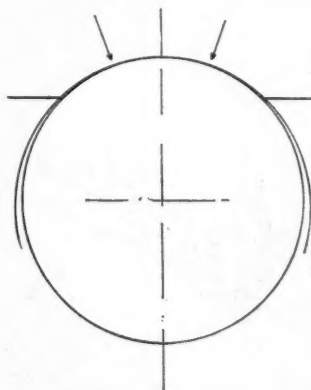
Baker  
Electrics





## When the Ball Becomes a Roller

¶ The real meaning of the Gurney 4% Raceway may be made very plain if we take the diagram of a ball resting in a curve of 4% greater radius, straighten out the race curve until it becomes flat, and then increase the diameter of the ball circle until it bears the same contact relation to the straight line that the ball originally bore to the 4% race groove. This diagram shows graphically what is the advantage gained by this sort of raceway.



¶ The roller bearing makers elongate and straighten out the ball into a roller in the effort to get more contact. We close up the raceway close to the ball to accomplish the same end. We realize as much in getting ample supporting contact surface and we avoid the difficulties inherent in all roller bearings consequent upon the necessity of maintaining alignment, and retain the advantages of the simplicity and low friction of the ball roller.

¶ A ball in a 4% race groove gets about the same degree of contact that one twenty-five times as large gets on a flat surface. The physical equivalent of a ball in a 4% raceway is not a ball twenty-five times as large, but a barrel-shaped roller having the same diameter as the ball and a crowning or bulging surface, the radius of the crown being twenty-five times the radius of the ball. Such a roller will support just twenty-five times as much as the ball on a flat surface. That is, the advantage of the 4% raceway is to multiply the supporting capacity of the ball by something like twenty-five. Or, one row of balls in a 4% raceway will hold up as much as 25 rows on flat raceways.

¶ This affords some explanation of our insistent emphasis of race contour. It also partly explains why the alleged greater capacity of the roller bearings, which their advocates so vociferously claim, is not in evidence in actual service.

**The Balls Are Better Rollers Than the Rollers,  
Especially When They Roll In Gurney Raceways**

**GURNEY BALL BEARING COMPANY, Jamestown, N.Y.**



25 feet of Famous  
"Yellow Strand"  
Wire Rope

Autowline Weighs  
only 4½ Pounds

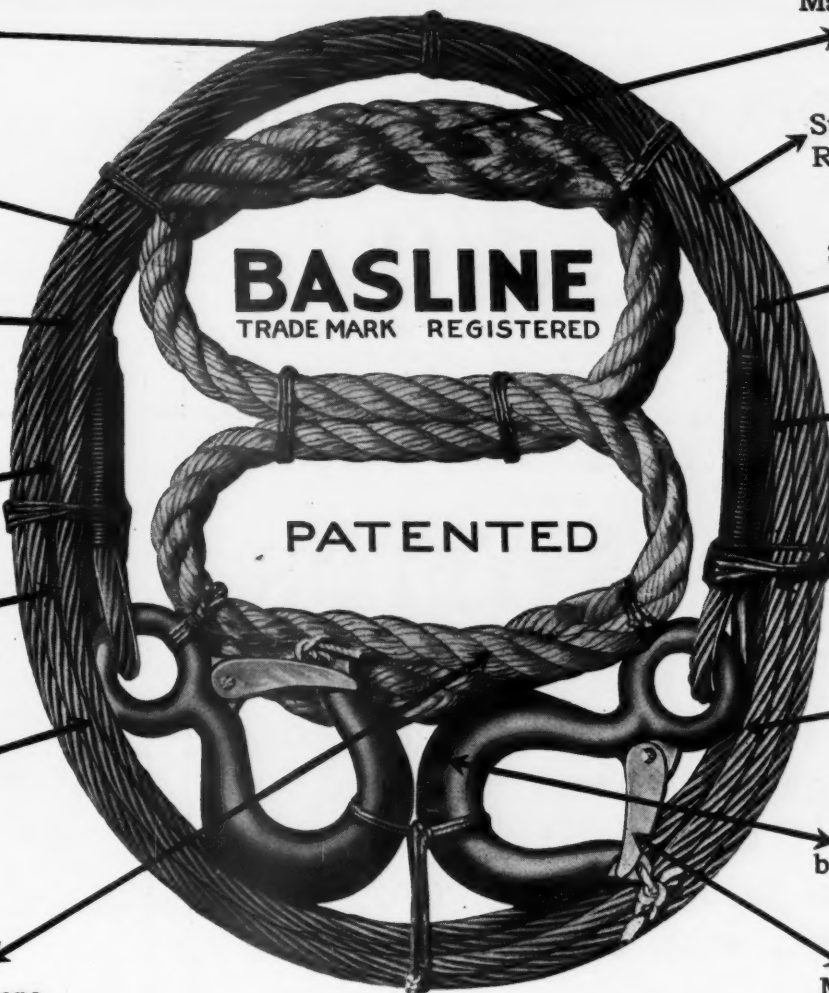
Pulls 4000 Pound  
Car up 20% Grade

Clean, Neat,  
Compact

Coils flat  
under Cushion

Not Bulky  
Like Manila Rope

Manila Slings  
prevent bending  
and breaking wire rope



Manila Slings Prevent  
Marring Paint

Stood Every Test on  
Recent Official Tours

Starts Stalled Wheel  
on Own Power

Illustration about  
Half Reduction

Put Autowline  
Under Your  
Cushion Today

Sold by all Live  
Accessory Dealers

Attached Instantly  
by these Snaffle Hooks

Snaffle Hooks Hold  
Manila Slings Securely

## If These Arrows Won't Convince You— Basline Autowline Will

AUTOWLINE has convinced hundreds of other careful car-owners that it's as important to their safety and peace of mind as a spare tire. That's why Autowline is always in their cars, winter and summer.

## Basline Autowline

will convince you, too, the minute your accessory dealer shows you this wonderful "Little Steel Rope with the Big Pull." Have him show you one this very day!

Buy it. Then you'll always get a tow home when your engine goes dead, 15 miles from anywhere—and you can help a brother autoist out of the ditch some other time.

Basline Autowline is under the cushions of cars owned by officials, past and present, of the A. A. A.

FREE—Write today for the fully-illustrated Autowline circular.

# Broderick & Bascom Rope Company

813 No. 2d Street, ST. LOUIS, MO.

New York Office, 76 E. Warren St.

Makers of Celebrated Yellow Strand Wire Rope

When Writing to Advertisers, Please Mention Motor Age.



# The 1913 Advertising of Automobiles Motor Trucks Accessories

as printed in 21 publications and shown in detail on chart published by THE DIGEST. Send us your name and address and copy will be sent you with our compliments.

Summary—Four Leading Publications—1913  
Number of Automobile Advertisers Using Each Magazine

	Motor Cars	Motor Trucks	Accessories	Total
The Literary Digest.....	42	18	73	133
Saturday Evening Post.....	51	9	69	129
Collier's .....	42	9	62	113
Life .....	40	11	47	98

Figures made from tabulation made by The Literary Digest

## The Literary Digest

303,000 circulation (January, 1914) among  
Business Men, Manufacturers, Professional  
Men, and worth while people everywhere.



# "Over the Hills and Far Away"

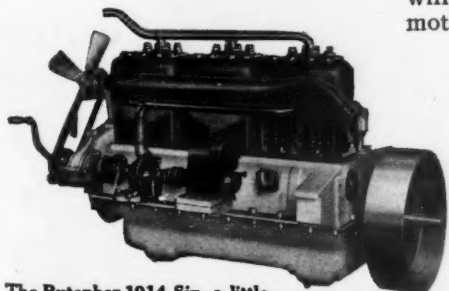


CHICAGO  
SHOW  
Space 26  
COLISEUM  
GALLERY

**T**HE ability to go when and where you please whether to the corner grocery or across the mountains into another State, with perfect comfort and with the confidence that your motor will never fail you, this is what you are entitled to when you buy an automobile. And this is what you get if you select a car that carries

## THE RUTENBER 1914 MOTOR Six

No roads are impassable to the Rutenber. No hills are too steep for it to negotiate. The masterful manner in which it is designed and built insure freedom from misadjustments and breakdown. Though you travel from coast to coast, as many owners of Rutenber-driven cars have done before you, there will not be one moment in which you need fear for your motor.



The Rutenber 1914 Six, a little more costly than other six cylinder motors, is the new standard toward which all others are striving.

There are so many excellent motor cars equipped with the Rutenber Motor that you should have little difficulty in selecting one perfectly suited to your most fastidious requirements. We will gladly send you our Book and a list of some of these cars. Write for it today.

**RUTENBER MOTOR COMPANY**

MARION, INDIANA



# INTERLOCKS

## Stop Tire Troubles

This is the famous Interlock Inner Tire which has *made good* all over the country in over a quarter million tires.

*The object of the Interlock* is to so increase the strength of the tire as to make it blow-out proof and practically puncture proof.

*The result of using Interlocks* is that new tires will give twice the usual mileage, while old or half worn-out tires will give several thousand miles *extra* service.

No matter what the cost of a tire, the *Interlock* is a big economy because it makes the tire last twice as long, frees you from tire trouble and minimizes liability of accidents.

### What the Interlock Is

The Interlock is a complete extra inside tire which is easily placed between the regular casing and the inner tube. It is made exactly like a tire, full round, endless, and with flaps locked to the rim so that it cannot heat or chafe; and does not interfere with either speed or resilience. The construction of the Interlock makes it take the strain completely from the side and rim of the tire as well as the tread.

**A New 1914 Feature—a Factory Guarantee Tag** is attached to each Interlock. This insures you, (no matter what happens) of a liberal factory adjustment for *a full year from date of purchase*.

**We Also Make a Complete Line of Reliners—Inner Shoes**

**—Outer Boots and Patches**

**Send for Special 1914 Dealers Offer** and catalog of our complete line. Let us tell you what we do to help dealers sell *Interlocks*. Read the records of official road tests. Investigate Interlocks. It will pay you to do so. We want good dealers everywhere.

**Double Fabric Tire Co.**  
530 9th St., Auburn, Ind.

*Originators and Largest Manufacturers of Tire Reinforcements.*

### INTERLOCK

INNER  
TIRE

Inner  
Tube

Outer  
Casing

Pressure Lock Flaps

When Writing to Advertisers, Please Mention Motor Age.



# CULLMAN

## SPROCKETS IN STOCK FOR MOTOR TRUCKS

Name	Sprock. No.	Teeth	Size of Chain			Hole	No. and Size of Drill Holes	Recess on 1 Side	Recess on other Side	Hub	Price
			Pitch	Width	Diam. Roller						
Buick	9201	11	1	5/8	5/8	1 3/8	Brass Bush			both sides	\$ 8 00
"	9202	24	1	5/8	5/8	Differential					7 00
"	9203	20	1	5/8	5/8	Taper				1 3/4" over all	4 50
"	9204	26	1	5/8	5/8	"				1 3/4" over all	5 75
"	9205	52	1	5/8	5/8	13 5/8	12-3/8	15 1/2 x 1/8			8 00
Cartercar	9206	48	1	5/8	5/8	13	10-3/4	14 x 1/8			8 00
Packard	9207	15	1 1/2	1	7/8	3 3/4	6-7/8				10 00
"	9208	44	1 1/2	1	7/8	16				with Brakedrum	50 00
Anderson Electric	9209	16	1	3/4	5/8	2 1/2	5-3/8				4 00
"	9210	51	1	3/4	5/8	12 1/2	6-3/4				16 00
Randolph	9211	16	1	3/4	5/8	1 1/2				detachable	5 00
"	9212	18	1	3/4	5/8	1 1/2				detachable	5 25
"	9213	16	1	3/4	5/8	2 1/4	6-7/8	4 3/8 x 1/4			4 50
"	9214	20	1	3/4	5/8	2 1/4	6-7/8	5 x 3/8			5 00
"	9215	58	1	3/4	5/8	14 3/8	6-7/8	17 x 1/8			15 00
"	9216	63	1	3/4	5/8	14 3/8	6-7/8				16 50
Rapid	9217	14	1 1/2	1	7/8	4 1/4				4 x 3/8" Key ways	10 00
"	9218	42	1 1/2	1	7/8	14	12-2 3/4	14 x 1/8			25 00
"	9219	14	1 3/4	1	1	4 1/4				4 x 3/8" Key ways	12 00
"	9220	36	1 3/4	1	1	15	14-2 3/4	17 1/8 x 1/8			25 00
Kissel	9221	15	1 1/2	1	7/8	3 3/4	7-1/2				10 00
"	9222	44	1 1/2	1	7/8	17	16-1/2				25 00
Reliance	9223	14	1 1/2	3/4	3/4	1 1/2	6-1/2				8 00
"	9224	14	1 1/2	3/4	3/4	1 1/2	6-1/2			1 5/8" over all	14 00
"	9225	16	1 1/2	3/4	3/4	1 1/2	6-1/2				8 50
"	9226	36	1 1/2	3/4	3/4	13 1/4	12-1/2	15 x 7/8			20 00
"	9227	42	1 1/2	3/4	3/4	13 1/4	12-1/2	15 x 7/8			22 50
"	9228	12	1 3/4	1	1	1 1/2	6-1/2			1 7/8" over all	14 00
"	9229	12	1 3/4	1	1	1 1/2	6-1/2			1 3/4" over all	15 00
"	9230	13	1 3/4	1	1	1 1/2	6-1/2			1 3/4" over all	15 00
"	9231	36	1 3/4	1	1	13 1/4	12-1/2	15 x 1 1/8		1 1/8" over all	28 00
"	9232	38	1 3/4	1	1	13 3/8	12-1/2	15 x 2 3/8			28 00
"	9233	41	1 3/4	1	1	13 3/8	12-1/2	15 x 3 1/8			30 00
Mack	9234	14	1 1/4	3/4	3/4	2	6-3/8	3 5/8 x 3/8			7 00
"	9235	16	1 1/4	3/4	3/4	2	6-3/8	3 5/8 x 3/8			8 00
"	9236	20	1 1/4	3/4	3/4	2	6-3/8	3 5/8 x 3/8			9 00
"	9237	40	1 1/4	3/4	3/4	12 3/8	8-3/8	14 5/8 x 3/8			18 00
"	9238	46	1 1/4	3/4	3/4	14 3/8	10-3/8	16 1/2 x 3/8			21 00
"	9239	14	1 1/2	3/4	7/8	2 1/2	6-1/2	4 3/8 x 1/8			8 00
"	9240	16	1 1/2	3/4	7/8	2 1/2	6-1/2	4 3/8 x 1/8			8 50
"	9241	20	1 1/2	3/4	7/8	2 1/2	6-1/2	4 3/8 x 1/8			10 00
"	9242	36	1 1/2	3/4	7/8	12 1/2	8-3/8	15 x 3/8			20 00
"	9243	38	1 1/2	3/4	7/8	14	8-7/8	16 1/2 x 3/8			21 00
"	9244	42	1 1/2	3/4	7/8	16 1/8	12-1/2	18 3/8 x 1/8			22 00
"	9245	14	1 1/2	1	7/8	2 1/2	6-1/2	4 3/8 x 1/8			9 00
"	9246	16	1 1/2	1	7/8	2 1/2	6-1/2	4 3/8 x 1/8			10 00
"	9247	20	1 1/2	1	7/8	2 1/2	6-1/2	4 3/8 x 1/8			12 50
"	9248	38	1 1/2	1	7/8	14	8-7/8	16 1/2 x 3/8	16 3/4 x 7/8		25 00
"	9249	11	1 3/4	1	1	2 1/2	6-1/2	4 3/8 x 1/8			9 00
"	9250	13	1 3/4	1	1	2 1/2	6-1/2	4 3/8 x 1/8			11 00
"	9251	15	1 3/4	1	1	2 1/2	6-1/2	4 3/8 x 1/8			12 00
"	9252	40	1 3/4	1	1	16 1/8	12-1/2	18 3/8 x 3/8			30 00
"	9253	46	1 3/4	1	1	16 1/8	12-1/2	18 3/8 x 3/8			35 00
Wilcox	9254	13	1 1/4	3/4	3/4	2 1/2	12-2 3/4				8 00
"	9255	15	1 1/4	3/4	3/4	2 1/2	12-2 3/4				9 00
"	9256	16	1 1/4	3/4	3/4	2 1/2	12-2 3/4				9 50
"	9257	45	1 1/4	3/4	3/4	12	6-3/4				18 00
"	9258	52	1 1/4	3/4	3/4	12	6-3/4				22 00
"	9259	15	1 1/2	1	7/8	3 1/4	6-1/2				10 00
"	9260	45	1 1/2	1	7/8	17 1/2	8-7/8				25 00



Catalogue

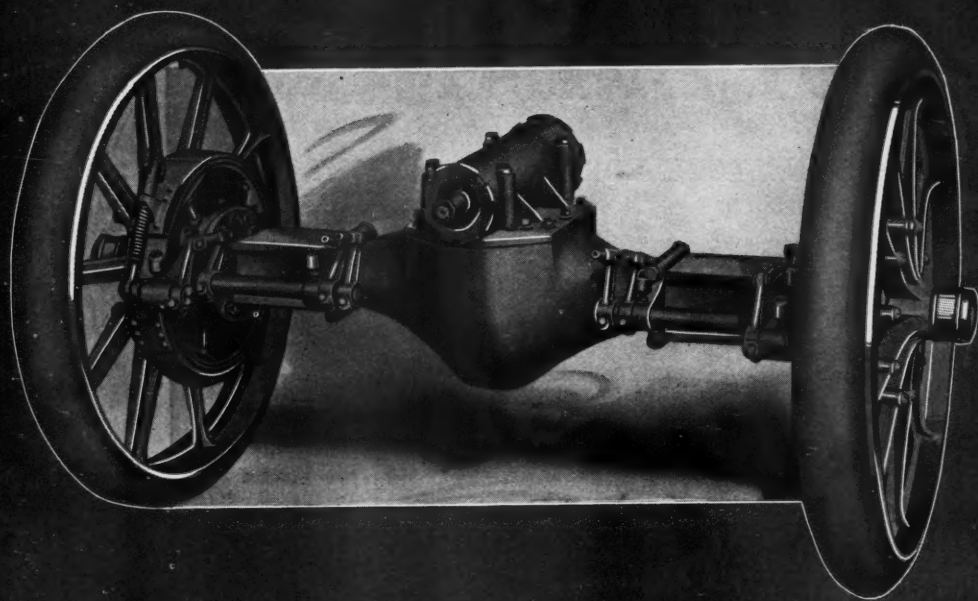
For Sprockets not listed and for Sprockets in quantity send for estimate.

We carry Diamond, Whitney, Baldwin and Culver-Taylor Chain in stock.

**Cullman Wheel Co.,**

**1341 De Tamble St., Chicago**





## THE BIGGEST STEP FORWARD in MOTOR CAR DESIGNING

### Sheldon Worm Drive

At the New York Automobile Show in 1902 only one pleasure car was exhibited with shaft drive. At this year's show the conditions are reversed. But it didn't take this many years for the majority of cars to adopt the shaft drive, the time was merely consumed in its **complete adoption**.

Today the motor truck industry is going through an identical evolution; the conclusion is a foregone fact. **You**, too, will soon come to the worm drive. Those manufacturers who have not yet seen the light will continue to produce trucks with two step reductions until the trade forces them to the worm gear drive. **But it's only a question of time.**

SHELDON WORM DRIVE has proved its value in actual experience. It has the maximum silence, simplicity, and efficiency. All parts work in a bath of oil reducing friction considerably. It has but a single reduction, fewer parts, and delivers the maximum power to the rear wheels.

SHELDON WORM DRIVE is built on accepted and standard principles. Into it is incorporated the utmost SHELDON experience.

You couldn't take a **bigger** step to place your trucks up with the leaders of the industry than by adopting worm drive. You couldn't take a **safer** step than by making it the SHELDON WORM DRIVE. It will deliver **more** power at **less** expense and make **your** truck a **better** truck.

### THEY DO STAND UP

Write us for complete details.

### SHELDON AXLE COMPANY

WILKESBARRE, PA.

CHICAGO OFFICE:  
68 E. 12th Street

SAN FRANCISCO OFFICE:  
444 Market Street

DETROIT OFFICE:  
1215 Woodward Avenue





## Some Plain Truths About Tires

**T**HE Firestone Economy of Most Miles per Dollar is a direct result of the Firestone method of building—from design to final test.

The Firestone design prevents all abnormal strain—the quality and quantity of Firestone rubber will stand furious heat and terrific wear.

The wrapped tread construction, the two-cure process, the open steam vulcanizing—are all principles vital to Firestone supremacy—Firestone economy.

Economy of upkeep follows naturally the resilience of the Firestone rubber which, by absorbing little shocks and vibration, means long life to the car.

An inspection of the cross-sections of a Firestone Tire shows that greater tread-toughness and greater tread-thickness are more than Firestone claims—they are fundamental Firestone facts—the vital reasons back of Firestone Service—Most Miles per Dollar.

**The Firestone Tire and Rubber Co., Akron, Ohio—All Large Cities**

*“America’s Largest Exclusive Tire and Rim Makers”*

Pneumatic Tires, Truck Tires, Pleasure Electric Tires, Carriage Tires, Fire Apparatus Tires, Rims, Tire Accessories, etc.

**Most  
Miles  
Per  
Dollar**

# Firestone

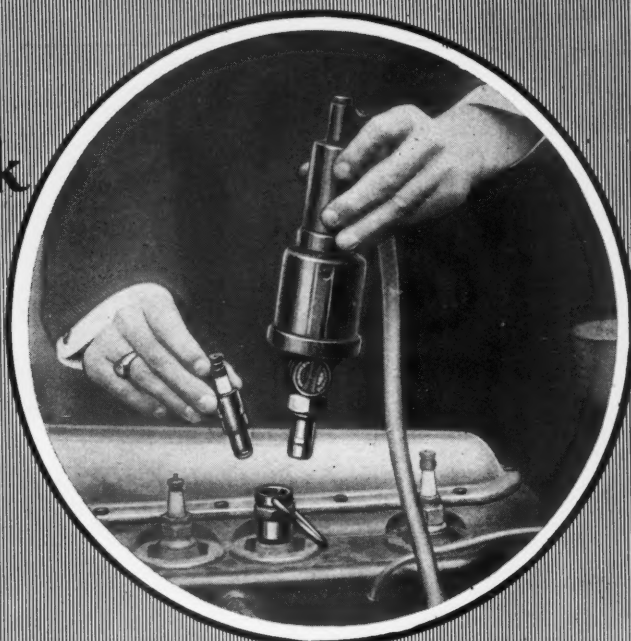
## NON SKID TIRES

*When Writing to Advertisers, Please Mention Motor Age.*



# A New Method of Using the **MAYO SPARK PLUG PUMP**

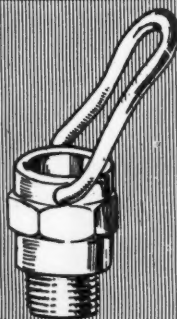
*The Spark  
Plug  
Core  
Slips  
Out—*



*The  
Mayo  
Pump  
Slips  
In!*



Spark plug core which slips and locks into adapter below.



Adapter into which spark plug core, or Mayo Pump can be slipped and locked.

**T**HE MAYO QUICK DETACHABLE SPARK PLUG is a new device aimed to add greatly to the motorist's convenience in using his Mayo Pump. It saves the time formerly taken for screwing the spark plug as well as the Mayo Pump in and out of the cylinder.

Either pump or spark plug can, by this new arrangement, be slipped in or out of the cylinder in 2 seconds' time. Thumb and forefinger are the only tools required. No danger of broken porcelains.

The MAYO QUICK DETACHABLE SPARK PLUG consists of an adapter, which fits permanently into the cylinder, and a spark plug core. A pump connection to be attached to the base of the MAYO Pump is furnished free with every MAYO Plug. (See illustrations.) Price per plug, \$1.50. The MAYO Plug is an "extra" and is not included in the regular price of the MAYO Pump.

Old model MAYO Pumps can be readily equipped with new style pump connections so that a MAYO QUICK DETACHABLE SPARK PLUG may be used.

**YOU CAN TRY A MAYO PUMP FREE ON YOUR CAR FOR THIRTY DAYS**

WRITE FOR PARTICULARS

**Pump Outfit Complete With Gauge, \$10.00**

**MAYO Quick Detachable Spark Plug \$1.50 extra**

*The 1914 Model MAYO Pump offers several other unique improvements in which you will be interested.*

See us at the Chicago Show, January 24-31, Spaces 231-233, Coliseum Annex, 2d Floor.

**MAYO MANUFACTURING CO.**

**35 E. 18th STREET**

**CHICAGO, ILLINOIS**



Pump connection attached to base of Mayo Pump so that it can be used with adapter.



Dummy to be used in adapter when pump is not in use, should adapter be installed in motor valve cap.





**WE** sometimes lose orders; our reason for losing them is generally the reason for our getting others.

We cannot compete on price, because we will not cheapen our product; consequently we lose orders from a certain class of motor car manufacturers.

It is for this same reason that other manufacturers prefer to place all their business with us.

When cars are built to sell at a price, the manufacturer is generally willing to risk another carburetor; the Rayfield has no place on such a car.

If a man will skimp the very foundation of his product, it's safe to assume that he is willing to take chances on other things.

The Rayfield Carburetor alone cannot make a poor car good; but the absence of the Rayfield on an otherwise excellent car will surely reduce that car in quality.

When an automobile engineer selects a carburetor to meet a price-requirement it invariably means trouble.

If he isn't looking for the best, he isn't looking for Rayfield; and if he buys on the "just-as-good-as" basis we probably couldn't help him anyway; we'd rather some one else sold him carburetors.

One manufacturer sells a car for \$1250 and buys the most expensive carburetor we can build.

Another builds a \$5000 car and also uses the best Rayfield we make.

The carburetors are not alike; they don't cost the same; and yet each is the best carburetor that can be built for that car *at any price*.

The Rayfield policy may seem a bit severe; exacting, perhaps, to certain manufacturers; but our very successful experience has convinced us that the standpoint we have taken does not call for explanations later.

We meet quality with quality; and when you see a Rayfield Carburetor on a car you can be pretty sure that sincere service is the basis upon which that car is built.

If you are going to be at the Chicago Show make the Chicago branch, 1140 Michigan Av., of the Rayfield Company your headquarters and have your mail addressed care of us.

**Look for the Rayfield Service Station in your city.**

**Findeisen and Kropf Manufacturing Co.**

2100 Rockwell Street, Chicago, Illinois

BRANCHES:

1140 Michigan Av., Chicago; 1211 Woodward Av., Detroit; 1902 Broadway, N.Y.

*When Writing to Advertisers, Please Mention Motor Age.*



# ENGLEBERT

THE TYRE OF 10,000 MILES



The greatest boon for the motorist is the 25% reduction in the prices of Englebert Tyres—Made in Belgium. You can't afford to use ordinary tires when you can get Engleberts at their present prices.

**DEALERS:** Your customers and your competitors' customers will demand Englebert Tyres in 1914. Do you want the profit on this business?

Some desirable territory still open; it may be in your community. Write for terms

**ENGLEBERT TYRE CO., 1928 Broadway, New York City**

*E. W. Elverson, President and General Manager. Sole American Representatives of O. Englebert, Fils & Cie., Liege, Belgium*

*When Writing to Advertisers, Please Mention Motor Age.*



Johns-Manville Service Branches in 49 Cities assure satisfactory service to Jones Speedometer owners  
Circles on map indicate J-M Service Branches Dots indicate location of direct representatives



WITH its five millions of capital and its tremendous resources in sales methods and service the H.W. Johns-Manville Company will hereafter control the selling, and, in connection with the inventor, Mr. Joseph W. Jones, the manufacturing policies of the

## Jones Speedometer

### Centrifugal Principle

This means that Jones Speedometer owners are assured efficient Johns-Manville service wherever they may be. It means that a Jones Speedometer is as conveniently kept in repair as a watch.

Forty-nine established Service Branches and 589 direct representatives throughout the country offer unrivalled repair and replacement facilities. No other speedometer manufacturer can honestly claim such far-reaching, efficient service.

And the H. W. Johns-Manville Company alone has the advantage of being able to distribute the great cost of this service over an extensive line of high-grade Automobile Accessories—rather than a single article.

That the centrifugal principle of the Jones Speedometer is absolutely accurate at all speeds—unaffected by temperature, vibration or magnetic in-

fluence—has been proved again and again by road and laboratory tests.

And now to the unrivalled qualities of the Jones Speedometer is added the unrivalled Johns-Manville Service.

The H. W. Johns-Manville Tag attached to every Jones Speedometer is a positive guarantee of mechanical perfection and sincerity of service.

You can have the Jones Speedometer installed in any car if you specify it.

Send for booklet describing why the centrifugal principle insures accuracy in Jones Speedometers—and learn more about the efficiency of the H. W. Johns-Manville Service.

## H.W. JOHNS-MANVILLE COMPANY

Manufacturers and Marketers of Brake Lining, Spark Plugs, Electric Lamps, Speedometers, Horns, Fire Extinguishers, Dry Batteries, Vaporizers, Auto Locks, Fuses, Tapes, Packings, Roofings, Pipe Covering, etc.

Madison Ave. and 41st St.

New York City

Note this H.W. Johns-Manville Guarantee tag on every Jones Speedometer



The tag that insures mechanical perfection and service integrity

#### H. W. Johns-Manville Co. Service Branches

AKRON, O.  
717 2d Nat. Bank Bldg.  
ALBANY, N. Y.  
200 Central Ave.  
ATLANTA, GA.  
31 A S. Broad St.  
BALTIMORE, MD.  
207-13 E. Saratoga St.  
BIRMINGHAM, ALA.  
561-52 Brown-Marx Bldg.  
BOSTON, MASS.  
55-59 High St.  
109 Mass. Ave.  
BUFFALO, N. Y.  
206-208 Main St.  
CHARLOTTE, N.C.  
117 Commercial Bank Building  
CHICAGO, ILL.  
323 N. Mich. Ave.  
1428 S. Mich. Av.  
CINCINNATI, O.  
654-656 Main St.  
CLEVELAND, O.  
413-15 Superior Av., N.W.  
COLUMBUS, O.  
45 W. Long St.  
DALLAS, TEX.  
503 Sumpter Bldg.  
DAYTON, O.  
239 4th St., Arcade  
DENVER, COLO.  
534 Denver Gas & Elec. Light Bldg.  
DETROIT, MICH.  
72 Jefferson Ave.  
872 Woodward Ave.  
DULUTH, MINN.  
205 Prov. Bldg.  
GALVESTON, TEX.  
2200-11 Strand St.  
HOUGHTON, MICH.  
96 Sheldon St.  
HOUSTON, TEX.  
410 Beatty Bldg.  
INDIANAPOLIS, IND.  
30 S. Penna. St.  
KANSAS CITY, MO.  
1321-23 Main St.  
LOS ANGELES, CAL.  
222-224 N. Los Angeles St.  
LOUISVILLE, KY.  
Paul Jones Bldg.  
MEMPHIS, TENN.  
45 S. Third St.  
MILWAUKEE, WIS.  
501-31 Clybourn St.

#### H. W. Johns-Manville Co. Service Branches

MINNEAPOLIS, MINN.  
251-253 3d Ave., So.  
NEWARK, N. J.  
239 Halsey St.  
NEW ORLEANS, LA.  
Cor. Magazine & Gravier Sts.  
NEW YORK, N. Y.  
Madison Av. & 41st St., Exec. Office.  
2190 Broadway  
OMAHA, NEB.  
1003 Farnam St.  
PHILADELPHIA, PA.  
21-25 N. Second St.  
514 N. Broad St.  
PITTSBURGH, PA.  
100-102 Wood St.  
PORTLAND, ORE.  
25 Front St.  
ROCHESTER, N. Y.  
651 Cham. of Com.  
ST. LOUIS, MO.  
501-505 N. 3d St.  
ST. PAUL, MINN.  
615 Ryan Annex  
SALT LAKE CITY, UTAH.  
306 Dooly Bldg.  
SAN FRANCISCO, CAL.  
24 & Howard Sts.  
SEATTLE, WASH.  
1020 1st Ave., So.  
SYRACUSE, N. Y.  
344 Gurney Bldg.  
TOLEDO, O.  
213 Water St.  
WASHINGTON, D. C.  
304 Union Tr. Bldg.  
WILKES-BARRE, PA.  
Coal Exch. Bldg.  
YOUNGSTOWN, O.  
502 Stambaugh Bldg.

The Canadian  
H. W. Johns-Manville Co., Ltd.  
MONTREAL, QUE.  
450-452 St. James Street  
TORONTO, ONT.  
19 Front Street, East  
VANCOUVER, B. C.  
511 Winch Building  
WINNIPEG, MAN.  
92 Arthur Street

This list is being steadily increased.

2259



# The Yuster CLEVELAND

**W**E take pleasure in introducing to the trade a new and complete automobile-axle factory, with modern equipment and a yearly capacity of 20,000 sets.

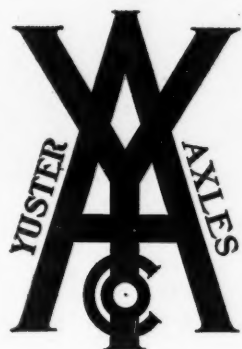
Improved manufacturing methods, large capacity and an efficient organization enable us to produce a high-grade and improved axle with imported bearings, at a price few axle makers can equal.





# Axle Company

## OHIO



The Yuster Axle Company is composed of men who have been connected with the manufacturing of automobile axles from the very inception of the modern motor-car industry.

We solicit inquiries from responsible manufacturers, and offer the co-operation of our expert engineering staff.

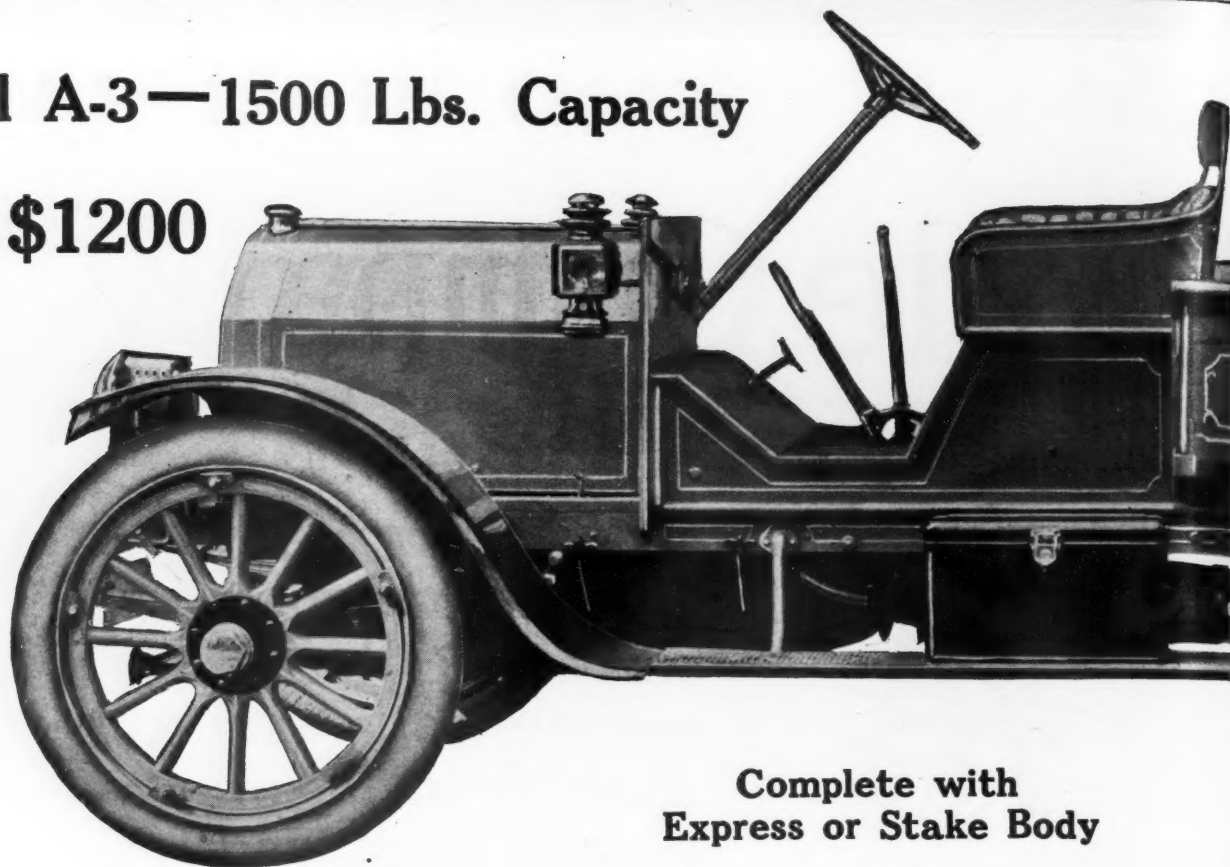
**The Yuster Axle Co.**

East 72nd Street and L. S. & M. S. Ry.  
CLEVELAND, OHIO U. S. A.



## Model A-3—1500 Lbs. Capacity

**\$1200**



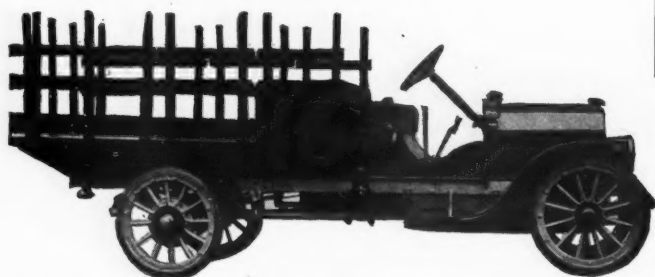
**Complete with  
Express or Stake Body**

# MENOMINEE

A 1500-lb. truck at \$1200; a 1-ton truck at \$1500; a 1½-ton truck at \$1950! Realize what those prices MEAN. Look the trucks over. Study their clean-cut, sturdy, business-like lines. Note their SPECIFICATIONS.

Check them up with the specifications of trucks selling at hundreds of dollars in advance of MENOMINEE prices.

Consider the **simplicity** of MENOMINEE Trucks.



**Model B 1-Ton Truck, Complete With Express or Stake Body, \$1,500**  
Motor: 30 h. p., 4-cyl. (4x4½), unit power plant. Transmission: Sliding gear, 3 speeds forward and one reverse. Wheelbase: 122". Drive: Shaft. Axles: Rear, full-floating; front, I-beam, drop forged. Carburetor: Schebler. Tires: 34x3½, detachable, solid rubber. Complete equipment of lamps, tools, etc.

Consider the **outsider's** opinion—the opinion of the men who **use** MENOMINEE Trucks.

Consider the **record** of the MENOMINEE—a record for economy of upkeep and operation, for durability, strength and persistent 365-day-in-the-year service which has never been equalled by a truck in the MENOMINEE'S price-class.

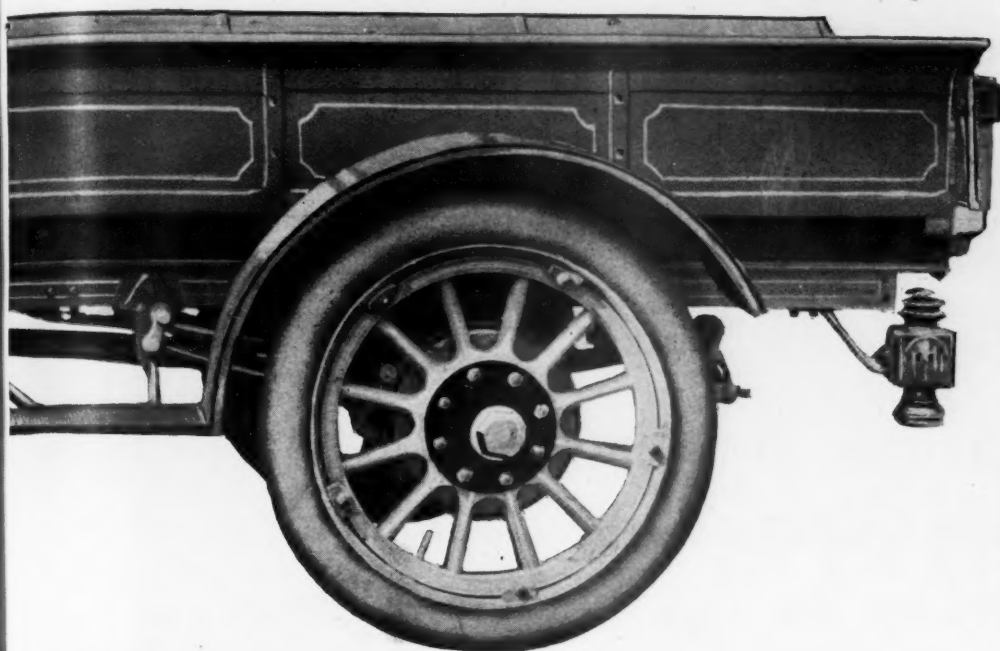
Then you will appreciate **why** MENOMINEE Trucks lead their field. Because they **under sell** as well as **over excel**.

*SEND FOR*

**D. F. POYER**  
**MENOMINEE,**



# \$1200—\$1500—\$1950



## TRUCKS

**Specifications Model "A-3"**  
**Loading Space**—Express body, 78x42 inches. Stake body, 84x80 inches.  
**Carrying Capacity**—1,500 pounds.  
**Wheel Base**—112 inches.  
**Wheels**—32-inch. Artillery pattern, made of second growth hickory, 1 1/4-inch spokes.  
**Tires**—32x3 1/2 inches, solid rubber or 34x4 Pneumatic.  
**Springs**—Front, half elliptic, 2 1/2 x 40 inches. Rear, platform, three-point suspension, 2 1/2 x 42 inches.  
**Frame**—3-inch heat treated channel steel.  
**Front Axle**—I-Beam, 2 1/2 x 1 1/4 inches, drop forged.  
**Rear Axle**—Full floating nickel steel live axle shafts.  
**Gear Ratio**—4 1/2 to 1.  
**Clutch**—Tempered discs so arranged that a stream of oil is thrown on them at all times while motor is running.  
**Carburetor**—Schebler.  
**Ignition**—Magneto and batteries.  
**Control**—Hand levers located in center of car.  
**Oiling System**—Automatic and a combination of force and gravity feed.  
**Steering Gear**—Adjustable worm and segment with 18-inch wheel. Steering column and wheel spider, black enameled.  
**Motor**—25 H. P., 4-cylinder, 3 1/4-inch bore and 4 1/2-inch stroke, fitted with governor.  
**Radiator**—Vertical tube. Honeycomb front effect and black enameled.  
**Transmission**—In unit with motor. Selective type, three speeds forward and one reverse, Nickel steel driving shaft.  
**Drive**—Shaft.  
**Maximum Speed**—25 miles per hour.  
**Brakes**—Internal and external with 14-inch drums on rear wheels.  
**Equipment**—Two gas headlights and generator, two side oil lamps, one tall oil lamp, one horn (all of which are black enameled with nickel trimmings), one jack and full kit of tools.  
**Price**—Car with express or stake body .....\$1,200.00

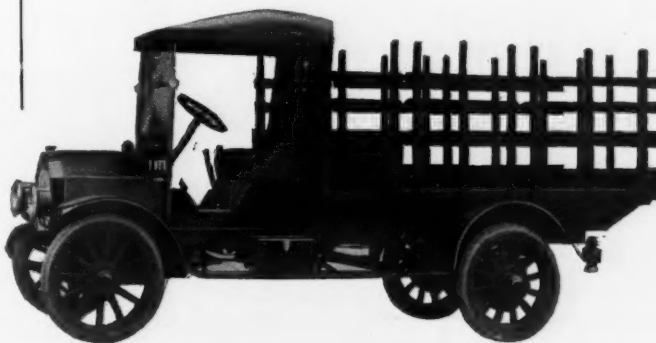
**DEALERS:** Businessmen—"hard buyers"—recognize that it is no longer necessary to pay MORE than MENOMINEE prices for GOOD trucks. The BIG demand in 1914 is to be for trucks of the MENOMINEE type.

MENOMINEE prices are **right**—MENOMINEE Trucks are **right**—and the concern back of MENOMINEE Trucks is **right**.

These three facts make 90% of the truck prospects in **your** territory MENOMINEE prospects. It is easier to **sell** the MENOMINEE than to compete with it.

If you are looking for a line of self-selling trucks—a line that reduces your sales efforts to the minimum—you want the MENOMINEE.

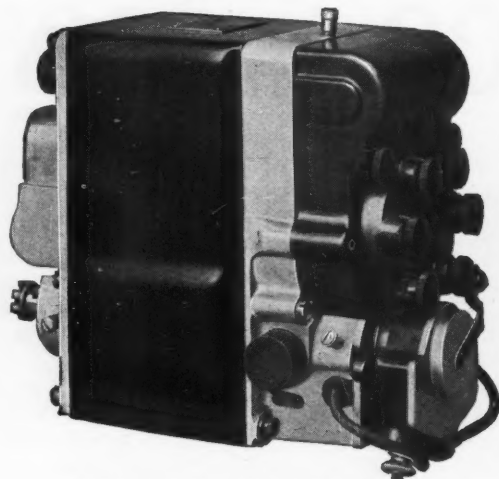
We don't ask you to work alone. We will co-operate with you. Write for generous dealers' plan, before your territory is taken.



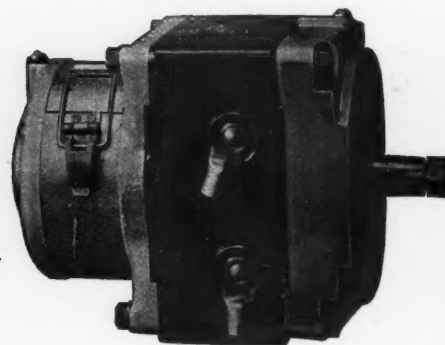
**Model C, 1 1/2-Ton Truck, Complete With Express or Stake Body, \$1,950.**  
**Motor:** 35 h. p., 4-cyl. (4x5), unit power plant. **Transmission:** Sliding gear, 3 speeds forward and one reverse. **Wheelbase:** 130". **Drive:** Shaft. **Axles:** Rear, full-floating, front, I-beam. **Carburetor:** Stromberg. **Ignition:** Bosch. **Tires:** 36x4, front; 36x5, rear, detachable, solid rubber. Full equipment of lamps, tools, etc.

LITERATURE  
**COMPANY**  
 MICHIGAN





Combined Ignition and Lighting Generator



Starting Motor

These Illustrations are representative of Westinghouse Automobile Equipment which is used on the cars of these Automobile Manufacturers:

Austin Automobile Co.  
A. C. Barley "Halladay"  
The Bartholomew Co. "Glide"  
Brewster & Co. "Delaunay-Belle-ville"  
J. I. Case T. M. Co.  
Chadwick Engineering Works  
Chandler Motor Car Co.  
Geo. W. Davis Motor Car Co.  
Dorris Motor Car Co.  
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## Starting—Lighting—Ignition Systems

### To Dealers and Repair Shops

Send us your name and we will mail you a complete set of instruction books on Westinghouse Electric Starting, Lighting and Ignition Systems, and place your name on our mailing list to receive new instruction books as issued.

### Westinghouse Electric & Manufacturing Co.

Automobile Equipment Division

EAST PITTSBURGH, PA.

Member Society for Electrical Development  
"Do It Electrically"





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These Westinghouse Electric Equipment Men will look after your interests,— Meet some of them at the Chicago Show, Balcony of Coliseum.

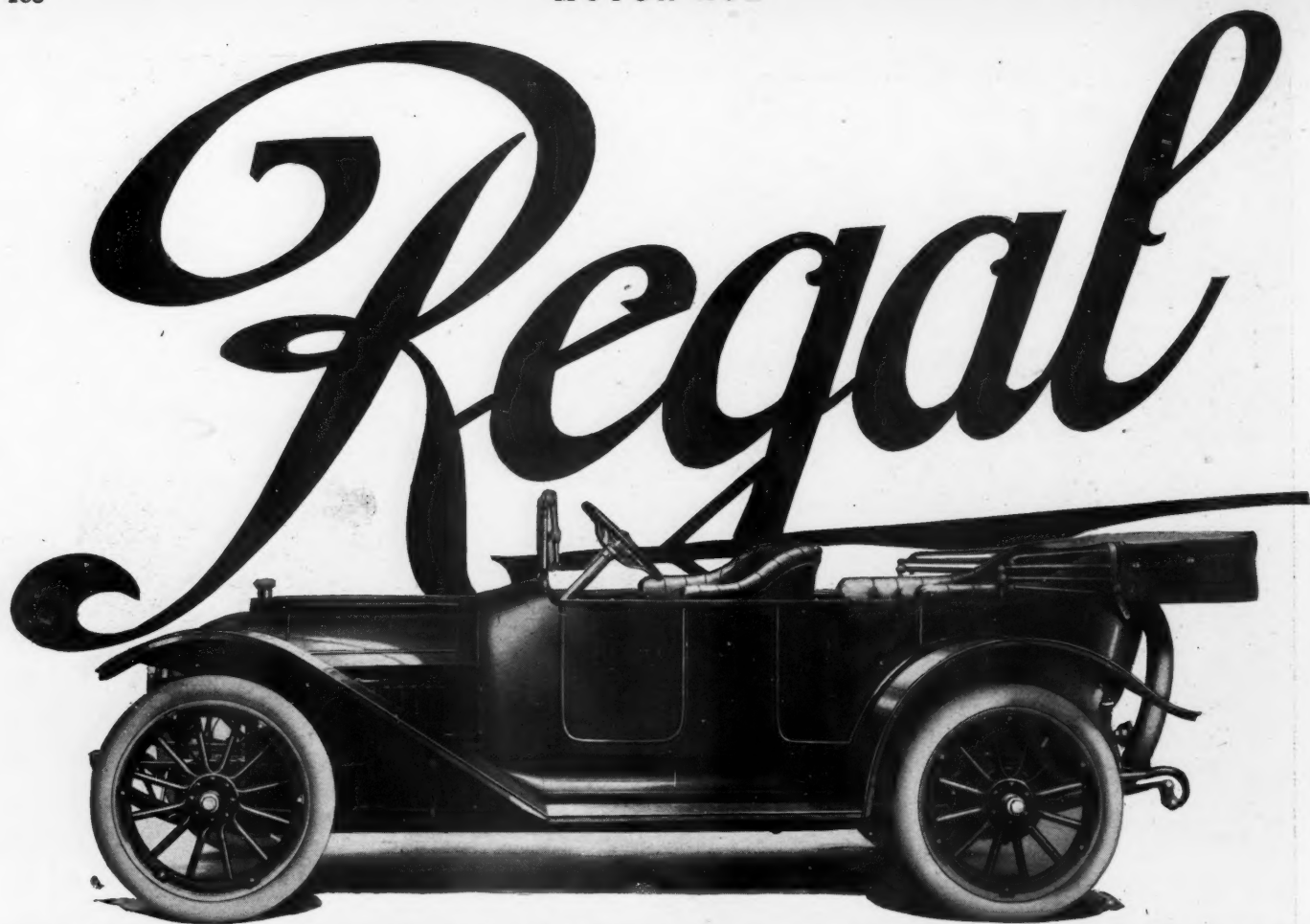
**Westinghouse Electric & Manufacturing Co.**

Sales Offices in 45 American Cities

East Pittsburgh, Pennsylvania.

When Writing to Advertisers, Please Mention Motor Age.





Model T—The Famous Regal Underslung

5-passenger touring car, electrically started and lighted. Completely equipped.

Price \$1125. f. o. b. Detroit.

## Join the Great Army of Regalists

A REGALIST is a motorist who has learned wisdom by experience.

There are thousands of them the country over—motorists who have learned that the exclusive Regal principles of construction make possible a comfort, a mechanical efficiency and an economy of operation unattainable in any other car.

These are facts which you can readily prove to your own satisfaction by inspection, by comparison and by test.

You should be very sure that the car you buy this

season is a car of *permanence*—a car with a *future*—a car that will emerge triumphant from any readjustment of conditions in the industry.

The Regal is a car that has made good because it is good—a car backed by seven years of success, made in a million-dollar plant by a company thoroughly sound and stable.

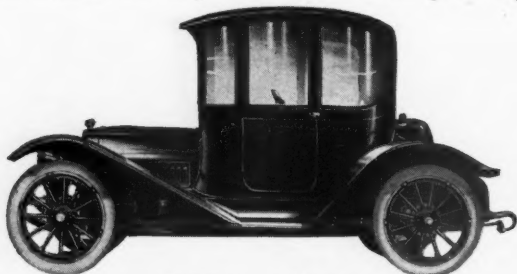
Do yourself the justice to see the Regal at your local dealer's showroom.

Or if you are in Chicago during the show, visit our exhibit, Booth E-4, Coliseum.

## REGAL MOTOR CAR COMPANY

123 Piquette Street

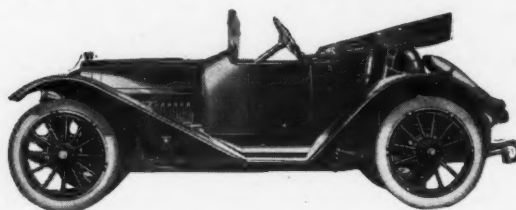
DETROIT, MICHIGAN



REGAL COUPE

The perfect all-the-year-'round car. Impervious to the elements in winter; easily thrown open to the breezes when warm weather comes; every operating mechanism inside; completely equipped, including electric starting and lighting.

Price \$1,600, f. o. b. Detroit.



REGAL MODEL N ROADSTER

The ideal small-family or professional man's car. Completely equipped; electrically started and lighted.

Price \$1125, f. o. b. Detroit.

When Writing to Advertisers, Please Mention Motor Age.





*A portion of our million-dollar factory in the heart of Detroit*

## And You, Mr. Dealer—Watch the Regal in 1914!

**T**HIS year will witness the real test, not so much of motor-cars as of motor-car manufacturers.

The dealer, like the motorist, should be especially careful in the selection of a car. For no dealer can build up a lasting, profitable business if at the end of a season he finds himself forced to make new connections through no fault of his own.

The dealers who make money this year will be those handling cars known to the public and in which motor-car buyers have confidence.

And the Regal is such a car. For seven years we have been building up an enthusiastic following, solely on Regal design and quality. The Regal is today the only popular-priced car with distinctive selling features; it enjoys public confidence to a marked degree.

Regal supremacy during 1914 will be still further enhanced by far-reaching plans for betterment, which will be announced in the early Spring. We do not hesitate to say that the Regal dealer in any territory will have the best-selling proposition in the field.

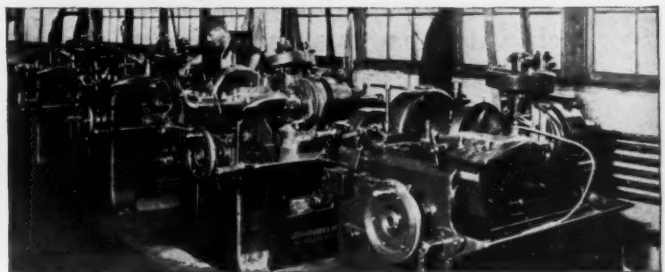
We want to meet and talk to every dealer handling or desirous of handling a popular-priced car, who visits the Chicago Show. Our exhibit will be at Booth E-4, Coliseum.

And if you don't visit Chicago, write us. If your territory's vacant, and you're the right man, we'll both benefit.

**REGAL MOTOR CAR COMPANY**  
123 Piquette Street DETROIT, MICHIGAN



*A corner of the great Regal factory.*



*Another view of the processes that make Regal cars.*

*When Writing to Advertisers, Please Mention Motor Age.*



# The Star of the Show



**At New York** the center of attraction was the Maxwell "25"—the incomparable \$750 car.

**But We Don't. Don't Need To.** The six sells on its own merits—and orders are always ahead of the factory output.

**At Chicago** it will be the same thing—for there's nothing on wheels that can compare in value with this car.

**It's the Same With the "35" Model**—the electrically lighted and started Maxwell that sells for \$1,225.

**Dealers Contended With the Crowd** of sight-seers for a look at the stripped chassis that was first shown at New York.

**This Car Competes in a Class by itself**—with other makes selling under \$1,500. And in its class it has no peer.

**And They Fought for Territory**—two and three dealers from the same town in many cases all wanted the Maxwell line for 1914.

**Power and Quality of Finish**—you can't equal this Maxwell anywhere at its price.

**It's the Winning Line**—that's conceded. It's the one best bet from the dealer's standpoint, because, while he gets a complete line, we do not insist on his taking a number of the bigger models in order to secure the agency for the "best" seller.

**So We Say to the Dealer**—You may order "35's" or "50's" as you need them—and if we're not too heavily oversold, we'll be glad to furnish them. But you don't have to specify a certain number of any model in order to secure the one you want most.

**There Isn't a Better Six** anywhere than the Maxwell "50-6" and surely never was such value as this magnificent seven passenger car at \$1,975.

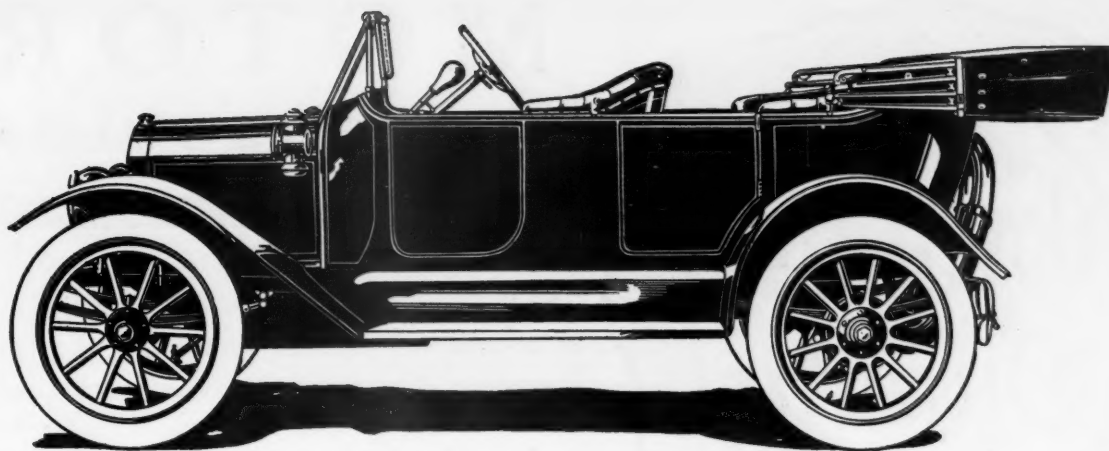
**That's an Envidable Position** for any manufacturer to occupy—three models, each of which is acknowledged leader in its own price and power class—but none of which competes with the other.

**If That Wasn't the Fact**, then we'd have to do as other makers do—we'd have to insist on the dealer taking a six for every three or four of the "25" model.

**That's the Maxwell Position** and that's why we now have our choice of dealers everywhere—we have what they want and no strings to it.

*When Writing to Advertisers, Please Mention Motor Age.*





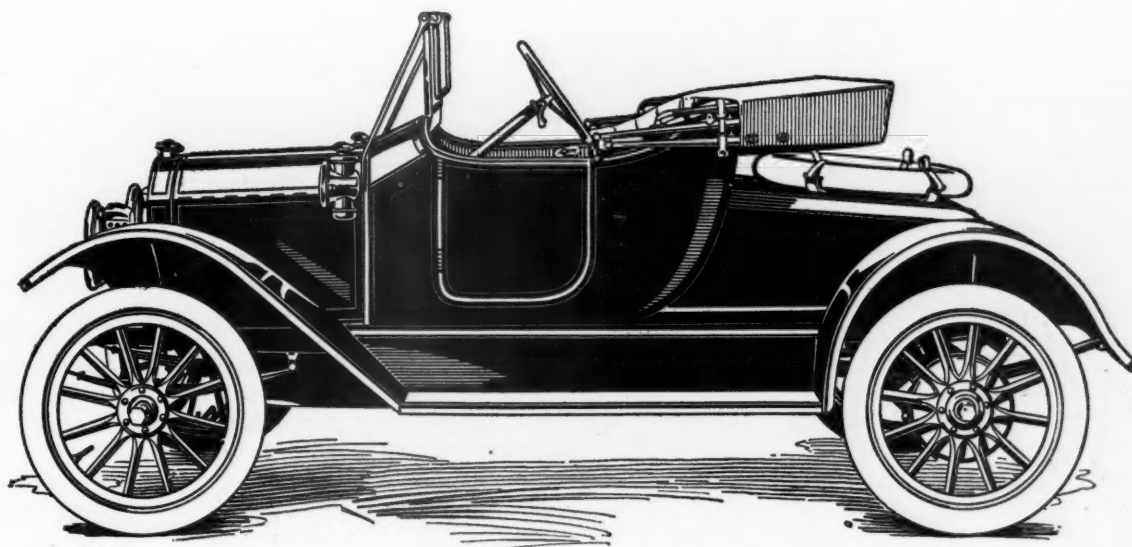
THE "25-4" TOURING CAR—\$750

**Come Early and See** the Maxwell exhibit before all the crowds get there.

**Study Closely, Critically,** that wonderful piece of engineering—the Maxwell "25" chassis. It's the lowest priced model we make and you'll say, "If this is so good, then surely the higher priced models

must be splendid." And that's true, too.

**We'll Show All Body Styles** on the "25" chassis at Chicago—the 5-passenger touring car—\$750; 2-passenger convertible roadster and utility car—\$725; the Town Car—\$950; and the light delivery wagon.



THE "25-4" ROADSTER—\$725

# Maxwell Motor Company, Inc.

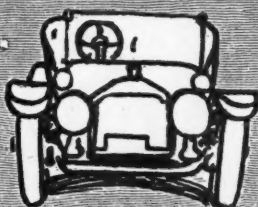
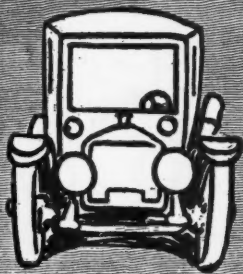
*Dealers and Service Everywhere*

**Detroit, Michigan**

*When Writing to Advertisers, Please Mention Motor Age.*



# MOTOR Accessories



The "Gibson Quality" Seal on any article used in connection with the Motor Car, is positive insurance that nothing better is obtainable. We maintain a department which makes comparisons, tests and investigations:—when they place their approval on any appliance we know it to be worthy of the "Gibson Quality" Seal.

Every article so marked is covered by an irrevocable guarantee.

## GIBSON QUALITY MASTER VIBRATOR

Possesses all the proven features required by an instrument of this type. Has genuine iridio platinum points, hardened over a special process; a magnet milled from a solid piece of tool steel. Is guaranteed covering operation, material and workmanship. It will make a Ford car run.



## GIBSON QUALITY DRY CELLS

Have established their reputation on results obtained. They are noted for their high amperage, long life and quick recuperation. Every battery is guaranteed: Any not meeting our claims will be replaced.

We welcome comparative tests on this or any other "Gibson Quality" article.

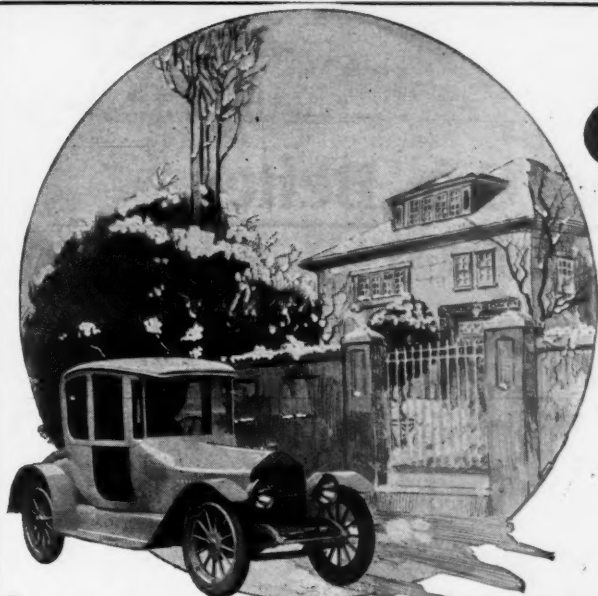
Write for the "Gibson Quality" catalogue. It is more than an ordinary list of accessories. It is of value to every Automobile Dealer, Engineer and Mechanic. Address your request to Accessory Department.

**Gibson Automobile Company**  
INDIANAPOLIS, U. S. A.



When Writing to Advertisers, Please Mention Motor Age.



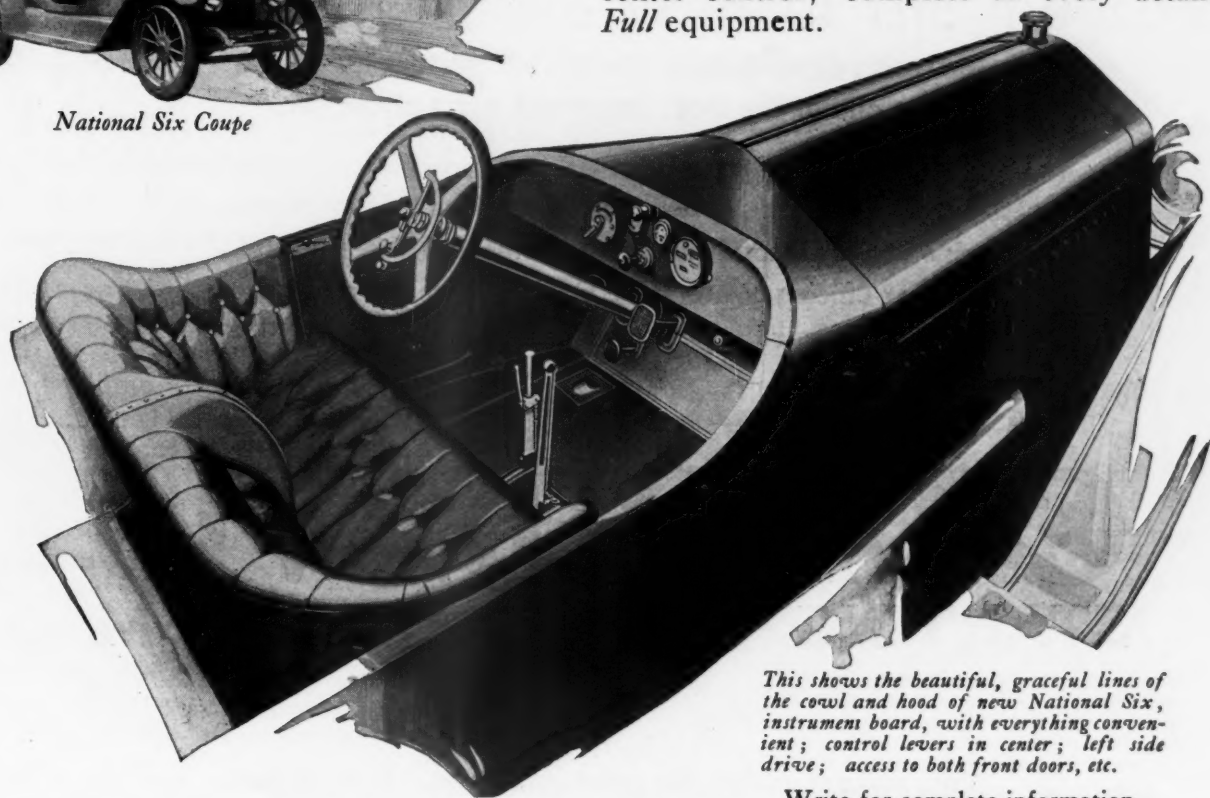


National Six Coupe

# National

## Six, \$2375

This new Six is beautiful, graceful in design, the most comfortable car you ever rode in, roomy, convenient, noiseless. Motor  $3\frac{3}{4} \times 5\frac{1}{2}$ ; 132-inch wheel base; electric starter and lights; cantilever springs; left side drive, center control; complete in every detail. Full equipment.

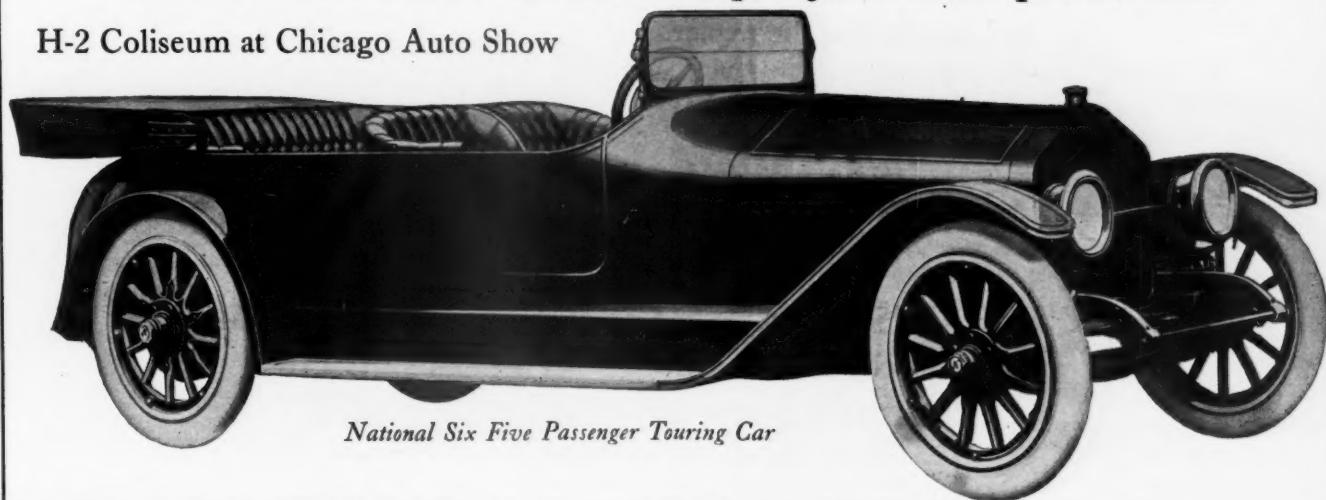


This shows the beautiful, graceful lines of the cowl and hood of new National Six, instrument board, with everything convenient; control levers in center; left side drive; access to both front doors, etc.

Write for complete information.

National Motor Vehicle Company, Indianapolis, Ind.

H-2 Coliseum at Chicago Auto Show



National Six Five Passenger Touring Car



## **Making The Good Car Better**

The good automobile, whether it sells for \$1075 or \$7000, is a better car if equipped with a highly efficient electric starting-lighting system.

So much depends upon the electric system that it becomes one of the most important parts of the car.

Safety at night. Quick, sure, certain cranking of engine under all conditions. Convenience, pleasure, and utmost efficiency are YOURS if you select an automobile equipped with the—

# **GRAY & DAVIS**

## **STARTING-LIGHTING SYSTEM**

This system makes the good car better. It is found on any car, regardless of price, whose manufacturer is intent upon securing starting-lighting reliability and service for the owner.

*Write for Catalog*

**GRAY & DAVIS, Inc.,**

**Boston, Mass.**



*Lexington*

FOUR

Here's a Frankness

*HOWARD*

SIX

That You'll Welcome

**T**O those who have studied motor car values in the last five years of the industry, the problem of factory and sales overhead is not a new one.

Too well they realize that enormous productions have been planned; sales campaigns laid out in proportion; and the quality of the product ultimately cheapened because from somewhere had to come the funds necessary to support the tremendous overhead.

The result has not always been pleasant for manufacturer, dealer or consumer; and if the resulting dissatisfaction were analyzed, you would find as the basic cause those very pitfalls which The Lexington-Howard Company have protected against from the start.

Here we have the ideal organization; a manufacturing company, primarily, with all the instincts of sound and sane production of an efficient car; built at a profit to themselves.

Here we see the persistent sales organization, progressive to a point of determination, yet conservative as regards the "sky-rocket" methods of the "get-rich-quick" schemer.

Here we find two cars—the Howard Six for \$2375, embodying just a little more, just a little better than any other car \$500 higher priced.

And we note in addition the high grade Lexington Four at \$1335; as good a car for the price as you will find anywhere.

Two distinct cars built in two distinct factories, selling to two distinct classes of buyers, but sold by one organization through one advertising campaign; one overhead.

Efficiency of this sort is not gathered from text books, but from experience; long years

of endeavor in the manufacturing world among men who look not so much to the big yearly profit as to the permanency of the organization and the good-will it holds with its trade.

Permanency calls for profits, of course, but the profits that we have planned are such that endorse a long and healthful existence.

Such an organization is an asset of no small worth to its dealers—it is a solid foundation upon which to build your future.

You dealers who look for frankness, integrity and solidity will do well to make immediate inquiry into the Lexington-Howard principles of business.

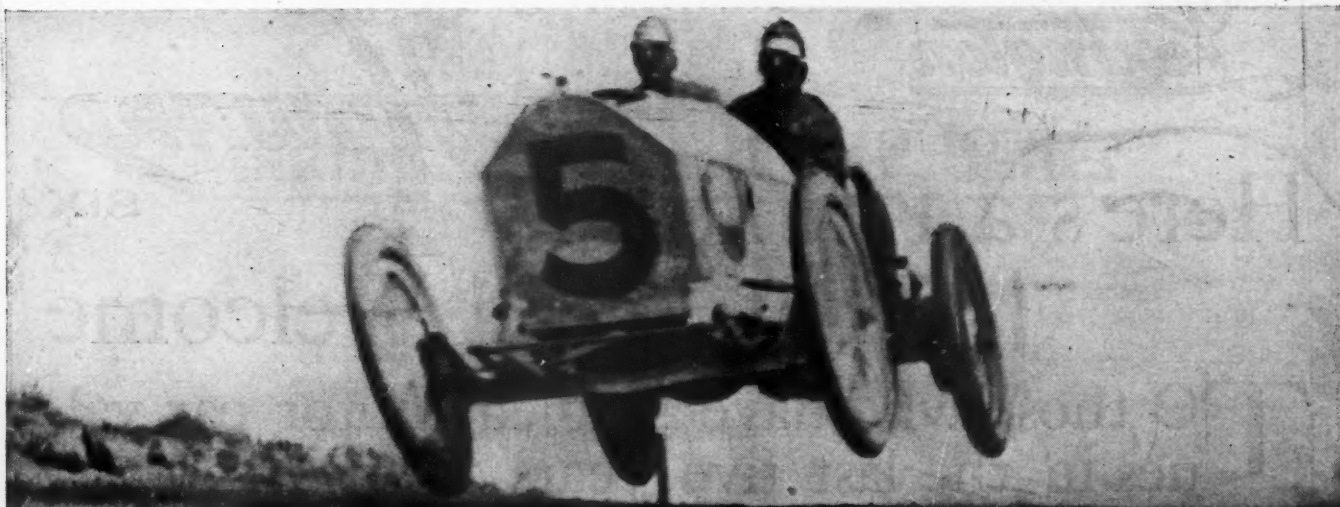
If you will be at the Chicago Show, look into our exhibit in the Coliseum basement, space 16½ and 17.

See the Howard Six for \$2375; compare it with cars \$500 higher; see the Lexington for \$1335; compare it with more expensive cars.

But most of all, talk to us about the organization that will stand back of you and with you through years of successful endeavor, and we believe that you will realize here is just the sort of an organization upon which your future as a motor car dealer rests.

**The Lexington-Howard Company**  
Connersville, Ind.





# America's Greatest Road Racing Car is Equipped Thruout With U·S·Ball Bearings

Road racing is the most merciless task to which ball bearings can be put. Ball bearings which will stand up superlatively under the terrific pounding experienced in a road race, will naturally withstand the worst abuse met in every day service.

America's greatest road racing car, the Stutz, is equipped *thruout* with U. S. Ball Bearings. This car holds the world's road racing record for cars in its class, as well as a record never before achieved in the history of road racing, that of winning 7 consecutive victories.

The U. S. Ball Bearings were, at the end of the racing season, taken out of the Stutz car which made the above record. They showed no perceptible wear. Despite the long grinds they

had gone through they were practically as good as new.

Ball Bearings with such a record are the kind manufacturers can bank on. When you know what a product *has* done, you feel pretty certain of what it *can* do—for you. In 1914 you will find U. S. Ball Bearings specified on cars that *do* things.

Write for complete information.

See us at the Chicago Show, Coliseum Annex, Second floor, Spaces 234-5-6

## U. S. BALL BEARING MFG. CO.

Main Office and Works:  
OAK PARK, ILLINOIS



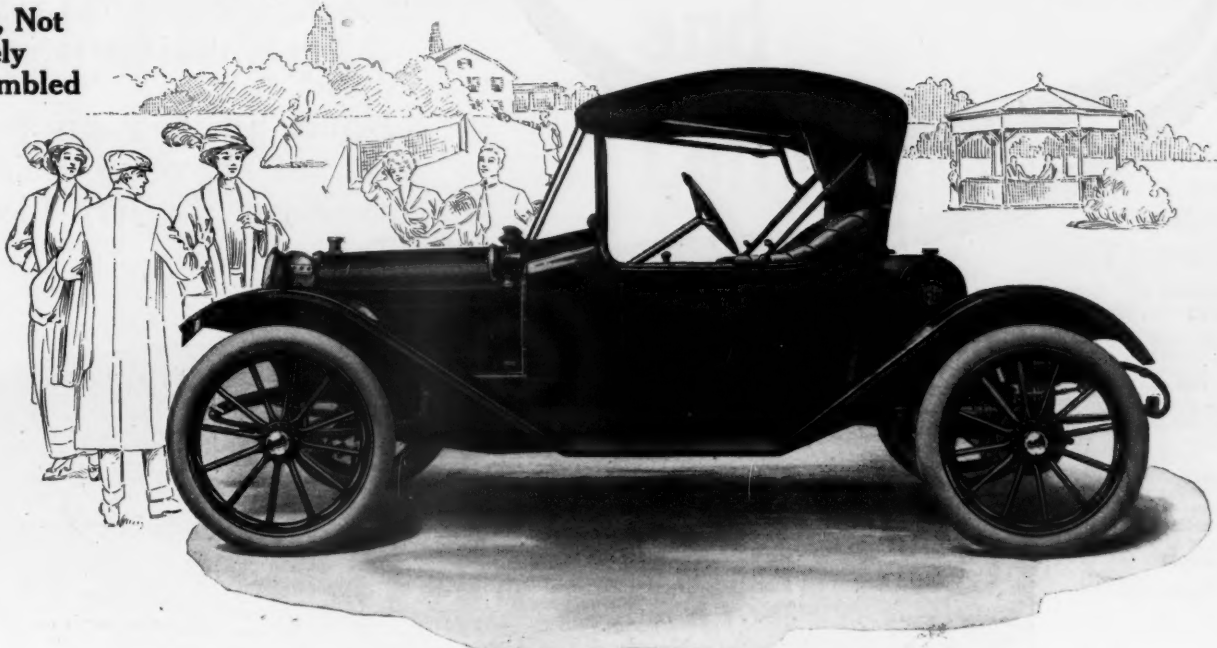
When Writing to Advertisers, Please Mention Motor Age.





The Car With the Biggest 1914 Demand—  
 "The Sturdiest Car Ever Sold at the Price"  
**The VULCAN 27—\$750**

Built, Not  
 Merely  
 Assembled



VULCAN 27 SPEEDSTER, \$750

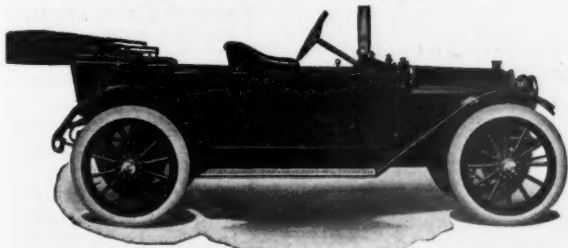
**AT THE COLISEUM SHOW, CHICAGO**  
 COLISEUM BASEMENT, SPACE B-2. JANUARY 24th to 31st

For over a year the VULCAN MANUFACTURING COMPANY has been preparing for ITS BIG 1914 PRODUCTION. The thousands who examined the VULCAN at the New York Automobile Show and noted its sound construction, its nickel steel gears and oversize bearings throughout, its long, low, rakish appearance, enthusiastically agreed that it is what we claim;—"the sturdiest car ever sold at the small car price." And strangely enough, the VULCAN does not appear small. With its long wheel base and its 32 inch wheels, it presents an appearance of motor car value that astounds those who look it over.

Every tool, jig, die and gauge is ready for the rapid and uniform production of VULCAN Cars. We are now turning out the finished product from our well-equipped factories at a regular rate, and with our sound organization and ample financial backing, we are ready and producing sufficient cars to serve every dealer that we accept.

We could have signed up enough dealers at the New York show to take our entire output, but we prefer to scatter our dealers as much as possible and particularly to locate them where our cars will be given the hardest service in the roughest places of the East and West, which other medium priced car manufacturers are careful to avoid.

We will be delighted to show our superior car and construction to dealers who see us at the Chicago Show.



TOURING CAR, \$850  
 115" Wheel Base

**Vulcan Mfg. Company**  
 Painesville, Ohio, U. S. A.  
 Lock Box MA 477



## IDENTIFICATION

This is the Jiffy License Tag by which every motor car buyer may be protected in getting real Jiffy Curtains. License Tag is sewed in the upper right hand corner of the right rear curtain, as shown in the illustration.

Before buying any motor car, ask the retail dealer to show you the Jiffy License Tag.

(Actual size and fac-simile of Jiffy License Tag)

Jiffy Curtains are protected by basic patents in the United States and most foreign countries.

UNITED STATES  
Pat. No. 926118  
" " 1018498  
" " 1024905

CANADA  
Patent No. 142933

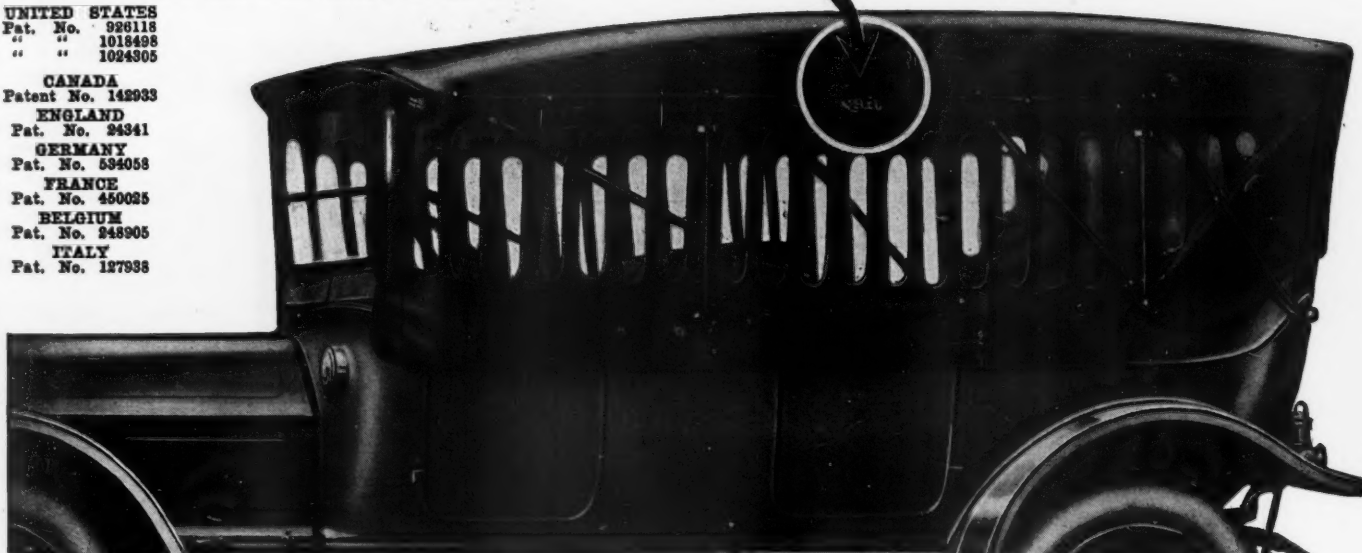
ENGLAND  
Pat. No. 24341

GERMANY  
Pat. No. 534058

FRANCE  
Pat. No. 450025

BELGIUM  
Pat. No. 248905

ITALY  
Pat. No. 127938



### MOTOR CARS "Jiffyquipt"

(Regular, Standard or Optional Equipment)

ABBOTT-DETROIT  
GRANDLER SIX  
COLUMBIA-KNIGHT  
FRANKLIN  
HUPMOBILE  
HOWARD-SIX  
HUDSON  
HAYNES  
KEETON  
KNOX  
LOZIER  
LUVIERNE  
MAXWELL  
MITCHELL  
MONARCH  
OAKLAND  
OLDSMOBILE  
PALMER-SINGER  
PILOT  
PAIGE  
PACKARD  
PIERCE-ARROW  
REGAL  
STUDEBAKER  
SPEEDWELL  
STEVENS-DURYEA  
WHITE

Jiffy Curtains are not only protection from rain, wind and cold, but answer the purpose of a limousine body.

They slide back from the door on a flexible cable at the top and can be put in place without leaving the car.

The all-window feature not only lights the interior, but gives a practically unobstructed view from the car.

The panel lights in Jiffy Curtains are always flat when folded up. This overcomes the objection found in ordinary large pane celluloid lights which are easily broken through constant rolling and unrolling.

They can be specified in the purchase of a new car or they can be fitted to old cars.

They can be adjusted to any top and are made of any fabric to match the top material.

At the New York and Chicago National Shows most cars exhibited will be "Jiffyquipt." Ask for a demonstration.

## JIFFY AUTO CURTAIN CO.

GENERAL SALES OFFICE

Dodge Power Building, Detroit, Mich.

When Writing to Advertisers, Please Mention Motor Age.

### MANUFACTURERS

Our royalty license proposition, enabling you to equip your car with Jiffy Curtains especially designed for it, should interest you. It has interested many of your competitors.

### TOP AND CURTAIN MAKERS

Thousands of car owners will welcome the chance to equip their present car with Jiffy Curtains. Our royalty license proposition enables you to fill this demand profitably.

Send for instruction book and full information.





# Greater Strength More Comfort and Longer Life

These are the three great essentials toward which all automobile manufacturers have been working and for which all automobile owners have been eagerly looking forward. They are now available for every car (no matter what size) that is equipped with the



Actual tests have proven Ideal Steel Wheels to be several times as strong as the best wooden wheels; stronger under *dead load* and under *lateral strain*, stronger under *torsional twist* and under *side swipe*. Violent skidding that would wreck a wooden wheel will not injure the Ideal Steel Wheel.

Until you have ridden in a car equipped with Ideal Steel Wheels you do not know the fullest joy of motoring. These wheels absorb the shocks and jars of travel, cushioning the car from all the inequalities of the roadway and adding to the resiliency of tires and springs. When your car runs on Ideal Steel Wheels you are *really* riding. One trial will convince you.

By relieving the tires of the greater part of their work, the Ideal Steel Wheel increases their life and helps to eliminate ordinary tire troubles. The spring steel spokes—by taking up a considerable amount of torsional twist—greatly relieve tires and mechanism of all strains and stresses imposed upon them through sudden engagement of the clutch and abrupt appliance of the brakes. Every part of the car is relieved of strain and sudden jerking by the cushioning effect of the Ideal Steel Wheels. The increased life and economy of your engine is easily worth more than the cost of equipping your car with Ideal Steel Wheels.

For complete information address

**The Ideal Steel Wheel Company**  
4619-4633 Spring Grove Ave., Cincinnati, Ohio

**IDEAL  
STEEL WHEEL  
COMPANY**

4619-4633  
Spring Grove Ave.  
Cincinnati

Please send complete details about the Ideal Resilient Steel Wheel.

I drive a.....  
(Name of car, model and year)

Name.....

Address.....

City..... State.....

When Writing to Advertisers, Please Mention Motor Age.





**S**PLITDORF PLUGS are an investment—never an expense. Their design and manufacture are warranted to overcome all fouling causes—we have records of their remaining in cylinder heads and giving perfect service an incredible time.

The other day an owner brought his 1910 automobile to our Chicago branch and complained of spark trouble. Upon examination the plugs, almost "frozen" in the cylinder heads, were found a trifle the worse for wear at the sparking point, but as clean as a whistle.

"When have you changed the plugs?" was asked.

"They came with the car — I've never changed them," came the answer.

"Don't you think you might invest in a new set after three years' usage?"

He thought so and INVESTED.

YOU SHOULD DO THE SAME.

*A full line of SPLITDORF up-to-the minute magnetos, transformers, plugs, electric lighting and starting outfits, etc., on exhibition at Chicago Show, Coliseum and Armory. Space 56 and 73*

## SPLITDORF ELECTRICAL COMPANY

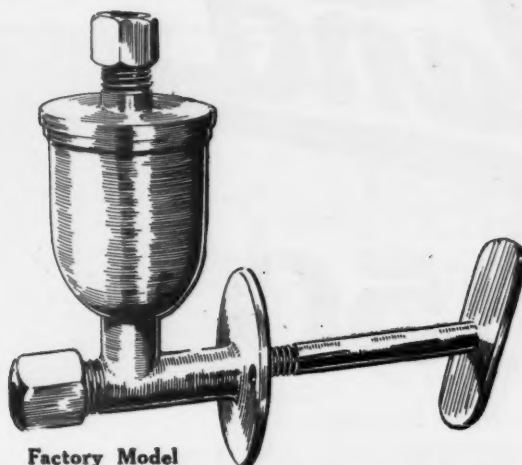
ATLANTA, 10-12 E. Harris St.  
BOSTON, 180-182 Mass. Ave.  
CHICAGO, 64-72 E. 14th Street  
DETROIT, 972 Woodward Ave.

KANSAS CITY, 1823 Grand Ave.  
LOS ANGELES, 1226 S. Olive St.  
NEWARK, 290 Halsey St.  
NEW YORK, 18-20 West 63d St.

PHILADELPHIA, 210 N. 13th St.  
SAN FRANCISCO, 1028 Geary St.  
SEATTLE, Wash., 1628 Broadway  
LONDON BUENOS AIRES

Factory: NEWARK, NEW JERSEY



\$3<sup>00</sup>

Factory Model

\$3<sup>00</sup>

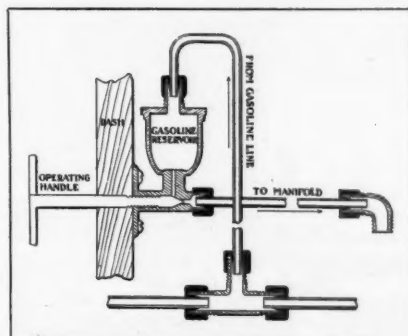
## \$3 FOR A SELF-REFILLING GUARANTEED PRIMER

This is the lowest priced *automatic* primer on the market. It works on the principle of *motor suction*. It fills itself! It is not to be confused with ordinary oil-cup primers that *you* have to fill. It never goes dry.

It costs less than a set of priming-cup spark plugs, which you have to get down *under the hood* to operate. The WEBB JAY operates from a convenient position *on the dash*.

Apply on the cost of a *trouble-proof* Automatic Suction Primer what you would pay for a *troublesome* oil-cup primer, or a set of priming plugs—and experience absolute priming satisfaction *for the life of your car*. When \$3.00 will end your hard-starting troubles *forever*, there is no excuse for being a day longer without a—

## Webb Jay AUTOMATIC SUCTION Factory Model Primer



Showing operation and installation of Factory Model.

Motor suction keeps the reservoir (see diagram) always filled. Turning the operating handle slightly opens a needle-valve which admits gasoline to the manifold and cylinders. The rich priming mixture formed explodes with the first spark.

### STARTS MOTOR INSTANTLY

Your motor starts on the first quarter turn. Properly operated, the primer is infallible. To draw a charge to your cylinders that will remain there ready for the next start, open the needle-valve wide while stopping the motor, then pull your switch plug, then close the needle-valve.

Motorists desiring a more elaborate suction primer will be interested in our De Luxe Model which embodies in its construction a sight-feed. Price \$6.00.

### GUARANTEED SATISFACTORY

When installed and used according to directions we guarantee our primers to do everything we claim for them or your money refunded. These primers can be quickly attached. Full directions accompany each primer.

### PRICES

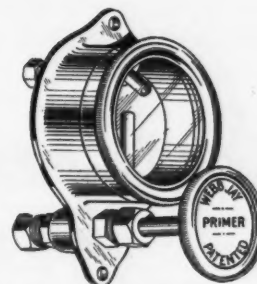
Factory Model, complete with fittings, \$3.00. De Luxe Model with sight-feed, complete with fittings, \$6.00. At all dealers' or sent direct on receipt of price. In ordering direct use coupon.

### CAR MANUFACTURERS:

Use our Factory Model Primer on your cars as regular equipment. Write for manufacturers' proposition.

**DEALERS:** We have some good territory still open. Get in touch with us.

Our primers are patented. Any infringements will be vigorously prosecuted.



De Luxe Model With Sight-Feed.

Price  
**\$6.00**

**The Motor Devices Company**  
2635 Wabash Ave., Chicago, Illinois

THE MOTOR DEVICES COMPANY, 2635 Wabash Ave., Chicago  
Gentlemen: Enclosed find (check, money order) for \$.....  
for which please send me (Factory Model, De Luxe Model) Primer(s).  
Name.....  
Address.....



# Overland

## \$950

### Completely Equipped

With electric starter and generator—\$1,075  
Prices f. o. b. Toledo

### Specifications

Electric head, side  
tail and dash lights  
Storage battery  
35 horsepower  
motor  
114-inch wheelbase

33x4 Q. D. tires  
Three-quarter float-  
ing rear axle  
Timken and Hyatt  
bearings  
Deep upholstery

Brewster green body  
Nickel and alumi-  
num trimmings  
Mohair top, curtains  
and boot  
Clear-vision rain-

vision wind shield  
Cowl dash  
Stewart speedometer  
Electric horn  
Flush U doors with  
concealed hinges

**D**URING the last quarter of 1913, ending December 31st, we produced and delivered over 12,000 Overlands—one-fourth of our entire output for the season. And this quarter is acknowledged everywhere as the poorest and dullest quarter of the year.

Despite this, and directly in the face of the slow season, we broke every existing sales record, not only of this quarter but of every previous quarter during our existence.

This is indisputable evidence that our 1914 production will be far oversold. Better get your order in now.

For catalogues please address Department 46

## The Willys-Overland Company

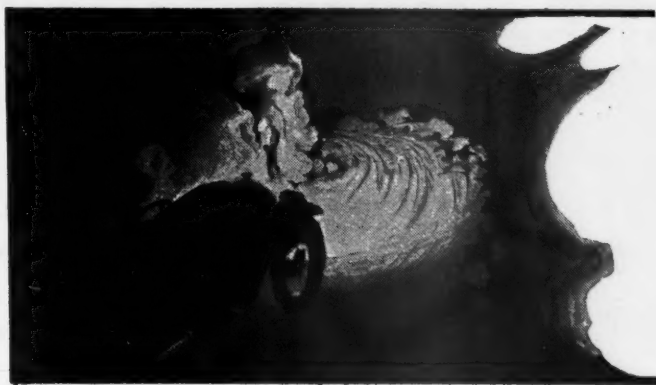
Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Garford and Willys-Utility Trucks. Full information on request.



When Writing to Advertisers, Please Mention Motor Age.





## You Must Have Reliable Light On Your Car!

### Prest-O-Lite

—illuminates *all* of the road, spreads its beams to show a sudden turn, shows the path directly in front of the car, gives an even, steady, brilliant light without eye-tiring rings or deceptive shadows. As a practical road light it is far superior to electric light.

### Prest-O-Lite

—by actual test, is operated at one-fifth the cost of any electric system. In addition to the saving in cost, it means a saving in power of your engine, which gives your car added efficiency on hills and in emergencies.

### Prest-O-Lite

—affords every "press-the-button" convenience, and every light on the car may be lit or extinguished from the seat by the use of the Prest-O-Liter. And should this convenience ever fail, you may still have all the light by the use of a match.

### Prest-O-Lite

—means a steady, reliable, economical supply of powerful light which no electrical system can guarantee. Actual experience is proving this fact every day. The absolute proof is yours for the asking.

THE PREST-O-LITE CO., Inc.  
233 Speedway, Indianapolis, Ind.

Please send information on ALL lighting  
systems to .....

### Electric Lights May Fail At Any Moment

You may drive for months and never meet an emergency.

But when the emergency comes, you place your safety—the safety of your passengers—upon your lights.

How is your car equipped to meet YOUR emergency?

Prest-O-Lite for years, on hundreds of thousands of cars, has proved its dependability.

Electric lights have proved decidedly unreliable.

A short circuit, the breaking of a delicate connection, a failure to meet a sudden strain, time after time, has resulted in a blinding shock to the driver by the abrupt change from a dazzling beam of light to total darkness. Even if no accident results, there is little hope for a repair—the emergency lamp is gone with the rest of the system—and the only way out is to abandon the car until the expert can get there.

### The Dealer Knows!

Dealers are aware of these facts. Many of them have sunk a large part of their profits patching up the electrical troubles of their customers. From all parts of the country, dealers have told us the story of their troubles with electricity. If your dealer doesn't tell you what he really knows about electric lighting—let us send you the letters of other dealers and expert electrical repairmen. Ask us.

### Use the Coupon!

**The Prest-O-Lite Co., Inc.**  
233 Speedway, Indianapolis, Ind.

(Contributor to Lincoln Highway)

**Exchange Agencies Everywhere**





**6 PASSENGER**  
**Partin-Palmer "38"**  
**\$975.00**  
**COMPLETELY EQUIPPED.**  
**38-H.P.**  
**115 INCH**  
**WHEEL BASE.**  
**ELECTRIC STARTER**  
**AND LIGHTING**  
**SYSTEM IF DESIRED.**

The Partin-Palmer Headquarters are in Chicago — the center of motor car activity.

See the Partin-Palmer "38" at the Chicago Show, Space E-5, Armory.

## Partin - Palmer Dealers Will Make Big Money This Season

This is going to be a mighty prosperous, profitable season for Partin-Palmer dealers. There is a big growing demand for this superb, six-passenger Partin-Palmer "38" selling at \$975 completely equipped. Users all over the country are wanting and asking for and buying the Partin-Palmer "38" at \$975.

The Partin-Palmer "38" was the "hit" of the New York Show. Many live dealers, when they saw this car, left with us bona fide, signed orders for early deliveries. They were quick to realize the profitable business they could secure with this franchise—just as you will be when you see the car itself.

### Most Wonderful Progress Ever Made By Any Motor Car

Don't fail to see the Partin-Palmer "38" at the Chicago Show. There isn't another car being sold today that has made such rapid progress in so short a time—that has created as great enthusiasm among both dealers and users.

Think what this car will mean to you and your business. A luxurious car, handsomely finished—a big,

powerful motor—sturdy construction—115-inch wheel base with every comfort and convenience found in cars selling for several hundred dollars more. It's the logical car for you—the logical car for your patrons. It's the car that will be in big demand this season.

### A Car Your Customers Want

The Partin-Palmer "38" gives you the opportunity to sell your prospects the kind of car they want—a newer, bigger, longer, more powerful car, at a price their business judgment will endorse. It's backed by a big clean organization—men who have made big successes in the automobile business. Men who know the kind of car that best meets the popular demand.

We can take care of a limited number of live dealers where we are not already represented. This is your opportunity to get the big end of the automobile business in your territory—a chance of a life time. Don't let it pass by.

If you are interested in making more money, building up your business on a solid foundation of quick, easy, satisfied sales, get in touch with us today. Tomorrow may be too late—so wire, phone or write today.

And be sure to call at our General Offices and Headquarters in Chicago, while at the Show—meet the officials of our company—let them tell you personally all the facts about the Partin-Palmer "38"—then decide what it would mean to you in hard dollars and cents to have this car on sale.

## PARTIN MANUFACTURING COMPANY

General Offices and Headquarters:

Suite 547, 29 South La Salle Street, Chicago



# The SENSATION of 1914



## The Crown Prince Pressed Steel Demountable Wheel

If you value safety, comfort, durability, more speed and less tire wear insist upon Crown Prince Wheels. No rust, no shrinkage, no wear, no breakage.

You wouldn't trust yourself in a car with a wooden frame—why take a chance on wooden wheels?

The leading cars of Europe—the Mercedes, Benz, Opel, Protos, N. A. G. and numerous others—have adopted Crown Prince Wheels as standard equipment in preference to both wooden and wire wheels.

Crown Prince Wheels will not break or buckle. They are over 200 per cent stronger than the strongest wooden wheel and 50 per cent easier on tires.

The ordinary wooden wheel is an assemblage of some twenty or more parts, each of which can become loose and cause damage or destruction to the car or its occupants.

Wire wheels are even more complex and have ten times as many assembled parts to become detached and give trouble.

The Crown Prince Wheel is a one-piece affair absolutely free from joints and guaranteed unbreakable. It is the last word in quick detachable wheels. In case of tire trouble a complete change of wheel can be made in less than one minute.

### CROWN PRINCE PRESSED STEEL DEMOUNTABLE WHEEL

Max Bachem, Sole Representative for U. S.,

845 Jefferson Ave. East, Detroit, Michigan



# We Will Ship the Empire Gasoline Economizer to Any Automobile Owner in the United States

## Read This Satisfaction Guarantee:

***"When you buy an Empire Gasoline Economizer your absolute satisfaction is guaranteed. If at any time you are not entirely satisfied with its operation, you may return it to us, regardless of its condition, and we'll send you your money instantly. We do not wish to keep money that you'd rather not have given us."***

Does that sound like we had confidence in the Empire Gasoline Economizer?

We don't ask or want you to take any chances whatsoever.

We claim that this instrument will double the mileage of your car per gallon of gasoline.

That it will reduce your gasoline bill from 20% to 80%.

That it will keep your spark plugs clean.

That it will keep carbon out of your cylinders.

That your motor will run better, freer, and more efficiently.

And if the Empire Gasoline Economizer fails to satisfy you in any particular, we don't want you to keep it.

The Empire Gasoline Economizer is attached to your manifold above the carburetor.

It holds back the too rich mixture from the carburetor and mixes with it more air.

There is nothing else in the world like it.

The Empire Gasoline Economizer is a patented instrument; no one can make or

sell any device that admits air to the cylinders above the carburetor and is connected to the throttle.

And unless you place an Economizer in just that position, you cannot expect success in any form, because additional air must be added *only after the original mixture* is made in the carburetor.

The Empire Gasoline Economizer can be attached to your car by any garage man in an hour.

You should not pay over \$2.00 to have it installed.

Remember the Empire Economizer is not only connected to your intake manifold; but to your throttle.

It acts when you act; when you increase the speed of your motor, you add more air.

Adding air causes the saving in gasoline bills.

Send a ten dollar bill and your business card. You'll receive the instrument prepaid.

And remember: we are just as interested in having you send it back if you are not absolutely satisfied after a 30 or 60-day trial.

## The Browne-Taylor-Greene Co.

DESK 204

1323-25 Michigan Ave., South  
Chicago

*See the Empire Gasoline Economizer at the Chicago Show*





## Save Your Car From Road Rack

Springs are not merely a matter of comfort—they are one of the most vital factors in the life and durability of the car. Springs take the shocks—the vibrations, the stresses the thrusts from the frame, the radiator, motor shaft, transmission and tires.

The better the springs the more they save your car. The making of perfect automobile springs is such highly specialized work that car manufacturers find it expedient to purchase from the best equipped spring engineers, designers and makers. Our list of patrons is an "Honor Roll" of the foremost American manufacturers. As in all manufactured products, there is a standard of excellence representing the highest development of the spring industry. That standard is



From the selection of the ore that is to make the steel to the final tests, every Detroit Spring is given careful supervision and inspection by some of the greatest experts in the country. Every Detroit Spring is *especially designed* for the make of car to which it is to be fitted.

It has its individual, three-fold heat-treatments, determined by the Detroit Steel Products engineering corps.

It is given tests specified by these engineers, and when it is finished, it is truly a part of the car for which it was made, even to the composition of the steel.

*Detroit Springs are Guaranteed for Two Years.*

Three final tests are given Detroit Springs, which subject them to far greater strains than they are likely to get in actual service.

Their resiliency is proved, their hardness, strength and elasticity. They are, therefore, guaranteed against settling and breakage—the twin troubles of every car-driver.

**Look for the Self-Lubricating Cups.** On the ends of each leaf are small lubricating cups filled with a long-lived lubricant which is spread between the leaves as they rub one upon the other. *This is a feature found in no other springs and forever prevents squeaking.*

Write for our new book, finely illustrated, telling the fact-story of Detroit Springs.



**FITTING** the leaves of the spring together is one of the most delicate processes in spring making. The experts tell when the leaves fit perfectly by the "feeling" through the pincers.

These men "fit" the leaves more accurately than any machine could possibly do it. They are high-priced men, but upon perfect fitting depends much of the resilience, life and strength of Detroit Springs.

**Detroit Steel Products Co.**  
2260 E. Grand Boulevard Detroit, Michigan

Also Manufacturers of *Fenestra*  
Harvey Friction Spring Gear, D. S. P. Drop Forgings, etc.

When Writing to Advertisers, Please Mention Motor Age.



# New Departure Ball Bearings

Panama  
Canal

New Departure  
Ball Bearings

American Made for American Trade



Like the Panama Canal, the New Departure ball bearing is the product of American experts.

The New Departure ball bearing was first offered to the trade something like six years ago, but the actual work of producing and perfecting this bearing started more than a decade back of that time when this Company began its experience in the manufacture of New Departure, anti-friction, ball bearing bicycle hubs.

The finesse of the art was reached when experts were employed to exhaustively study the manufacture of anti-friction bearings in all parts of the world. These men were instructed not only to learn what had been done, but to improve upon methods, processes, and results that marked the ultra attainments at that time. This work has absorbed a vast amount of investigation, investment, and invention, all and always with the American determination to excel.

*Result—The ball type of bearing was selected because it more completely eliminates friction and, therefore, fulfills the purpose of an efficient bearing.*

*Result—Ten and a half acres of modern machinery, operated by 2,000 skilled artisans, producing 10,000 guaranteed ball bearings per day.*

To quote an old axiom, "Nothing succeeds like success."

Literature on request. Co-operative engineering service for the asking.

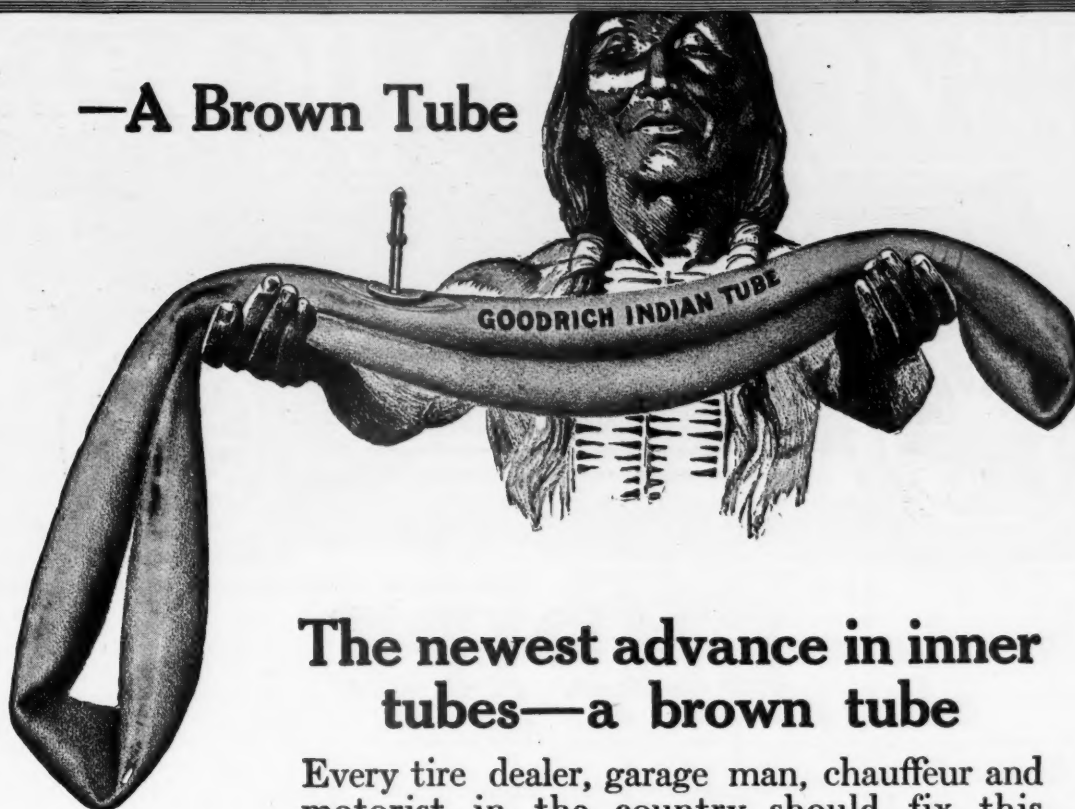
## The New Departure Mfg. Co.

Main Office and Works  
BRISTOL, CONN.

Western Branch  
1016-17 Ford Bldg.  
DETROIT



## —A Brown Tube



### The newest advance in inner tubes—a brown tube

Every tire dealer, garage man, chauffeur and motorist in the country should fix this standard in his mind—a *brown* tube.

Goodrich Tires give the motorist everything science and skill can produce in quality of construction and quality of service.

Now Goodrich, as usual, takes the next step in advance, and improves the *whole* tire service with what every judge of rubber and every judge of construction will say is the last word in inner tubes. We call it the

# Goodrich Indian Tube

We give it this name because it is made of the cream of the finest rubber gathered by the native Indians in the richest rubber country.

It is hardy, enduring, full of vitality—like an Indian.

It is built for speed—like an Indian.

It is brown—like an Indian.

It is the pure breed—like an Indian.

It is "best in the long run"—like an Indian.

You'll always know it by its color—copper-brown, Indian-brown.

The Goodrich Indian Tube will never be judged by the price, nor bought solely

because of the price. Like all Goodrich products it will stand on its perfect quality and its dependable delivery of full service.

The man who buys it will take the Goodrich word for it that his money never before bought such an inner tube as this *brown* tube, the "Indian."

For the dealer it will make that greatest of all business friends—the more-than-satisfied customer.



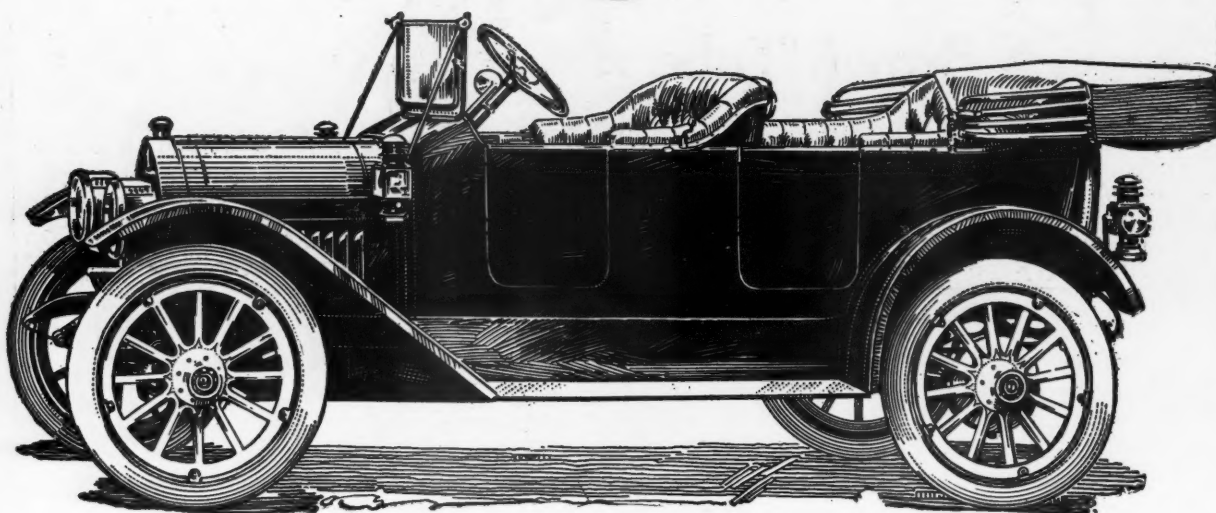
**The B. F. Goodrich Company**

Factories: Akron, Ohio      Branches in All Principal Cities



*There is nothing in Goodrich Advertising that isn't in Goodrich Goods*





# EMPIRE

*"The Little Aristocrat"*

Completely Equipped

## Now \$900

*With Remy Electric Starting and Lighting System \$1025*

Basic principles of design and construction unchanged; severest tests and hundreds of thousands of miles proved them right. *But a score of refinements and improvements* are incorporated in the new series Model "31" EMPIRE for 1914 that make it still a better car than last season's EMPIRE, and it sells for less.

### New Stream Line Roadster or Five Passenger Touring Car

Completely Equipped \$900 Including

Remountable Rims  
Mohair Top  
Top Envelope  
110" Wheel Base

Unit Power Plant  
Rain Vision Windshield  
Tool and Tire Kits  
Extra Rim

Stewart Speedometer  
Prest-O-Lite Tank  
Gas Head Lights  
Side and Tail Lamps

Eisemann Magneto  
Double Tire Irons  
Oil Sight Feed  
Dash Air Adjustment

*With Remy Electric Starting and Lighting System \$1025*

**See the Special Empire Show**

**Ralph Temple Automobile Company  
1219 MICHIGAN AVENUE, CHICAGO**

*New Stream Line Roadster will be on View and  
Remy Electric Starting and Lighting Model*

Empire Automobile Company, 448 N. Capitol Ave., Indianapolis, U. S. A.



# The DANN OIL CUSHION SPRING INSERT

*is Standard Equipment on*

*The Borland*  
Electric

Determined to make their car the easiest riding electric on the market, the Borland-Grannis Co. of Chicago has adopted the DANN OIL CUSHION SPRING INSERT as standard equipment.

## Manufacturers! Garagemen! Repairmen!

The action taken by the Borland-Grannis Co. is but an indication of the coming standardization of the DANN INSERT in automobile construction.

At the New York Show the DANN INSERT was one of the chief sensations. Manufacturers, mechanical experts, dealers and motorists expressed the opinion that the Insert would revolutionize spring construction.

CAR MANUFACTURERS will find the DANN INSERT to be a talking point which will swing sales in the right direction. It is as strong a sales "clinger" as self-starters or electric lights. They are conveniences. The DANN INSERT is vitally necessary to long car life and perfect riding comfort—two of the greatest motoring essentials. Foresighted manufacturers who see which way the wind of popular approval is blowing are falling in line with the Borland-Grannis Co.

GARAGE AND REPAIR MEN must realize that the DANN INSERT opens up to them a virgin field—full of possibilities for quick and numerous sales.

Consider that there are over 1,200,000 cars in the United States without adequate spring protection. The owner of every one of these cars is a live prospect. Your opportunity is limited only by the number of car owners in your territory. The insert can be installed in the springs of any car. Although much of our territory was allotted to dealers at the New York show, we have a number of sales districts still unassigned. Immediate action is necessary. Wire or write us.

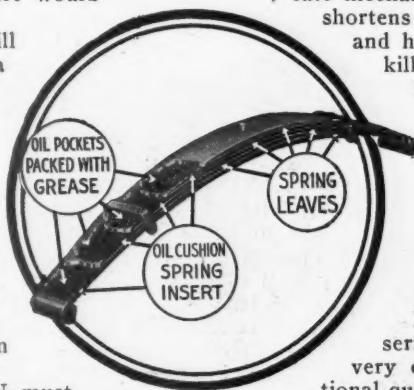
## What the Insert Will Do

The DANN OIL CUSHION SPRING INSERT provides permanent lubrication between the spring

leaves. It is the only construction of its kind which absolutely keeps springs from "going dry," squeaking or rusting. It improves the riding qualities

of any car, adds to its life of service, decreases the liability of spring breakage, and saves wear on tires. When after a few weeks' use the lubricant squeezes out of ordinarily constructed springs, the springs are left to rust, become stiff, almost rigid. Spring squeaks follow. The car rides hard. Dry, rusty, stiff and squeaky springs become conductors of the very force they were designed to absorb—VIBRATION!

Vibration is what eats up tires, racks the delicate mechanism of a car, boosts its upkeep, shortens its life. The DANN INSERT—and here's the big point—reduces car-killing vibration to the absolute minimum.



## What the Dann Insert Is

The DANN OIL CUSHION SPRING INSERT is a thin, perforated strip of metal, designed to go between the spring leaves from tip to tip. The insert metal is of special composition, very ductile, and possessing anti-frictional qualities.

The perforations in the Insert are filled with a heavy lubricant, made in our own factory from a special formula. A thin membrane on top and bottom of the Insert prevents the lubricant being dislodged from these oil pockets in the course of installation. After the Insert is installed, spring motion causes this membrane to assimilate with the lubricant.

Once bolted and clipped between the spring leaves, it is physically impossible to squeeze the lubricant out of the pockets in the Insert.

**See us at the Chicago Show,  
January 24-31,**

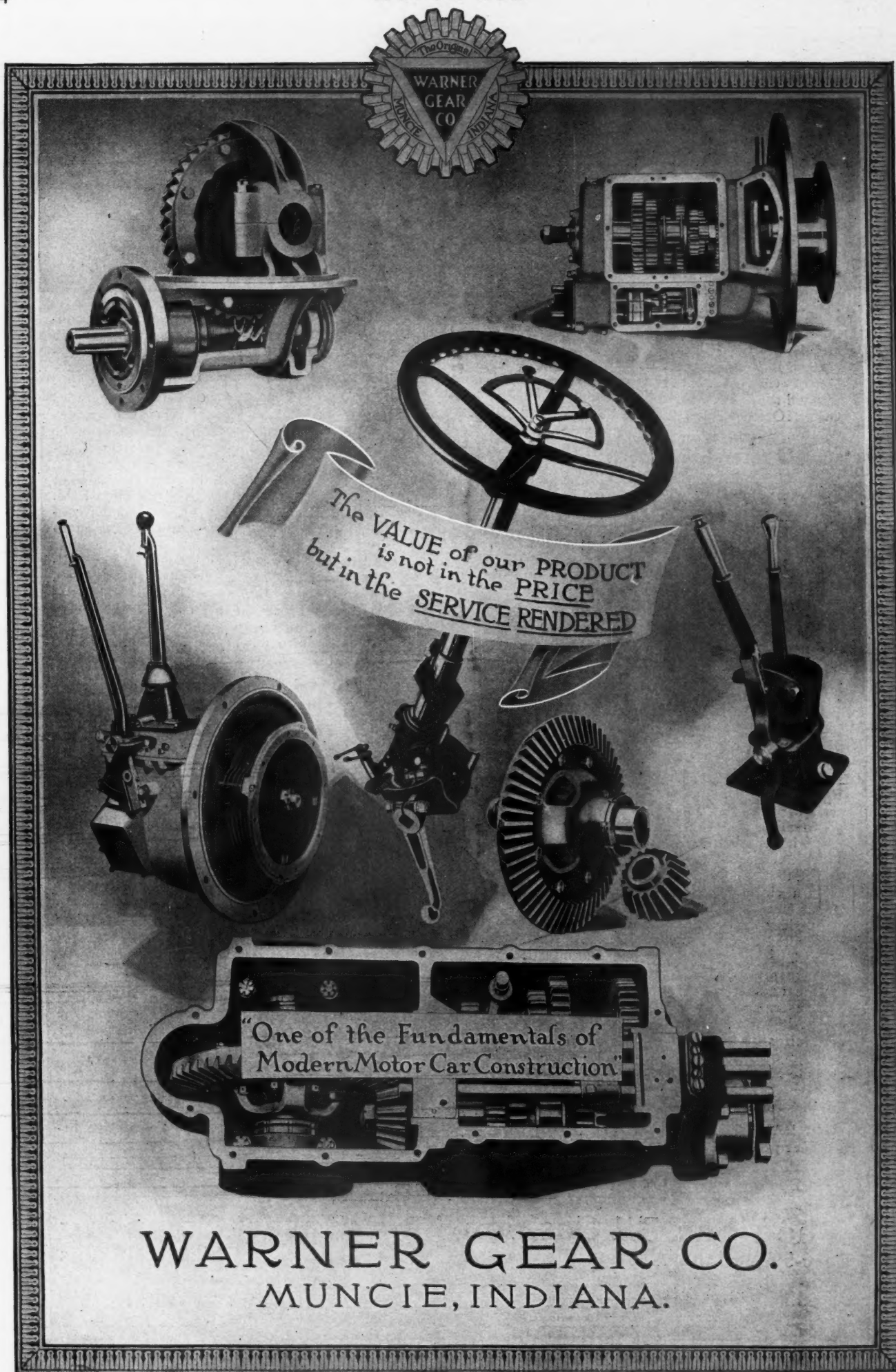
**Gallery, First Regiment Armory,**

Sample of Insert and complete descriptive literature sent on request.

**"Oil Cushionize Your Springs!"**

**The Dann Oil Cushion Spring Insert Company**  
2246-50 Indiana Avenue Chicago, Illinois





The advertisement features a collection of mechanical parts from Warner Gear Co. arranged around a central banner. At the top center is a gear-shaped logo with the text "The Original" at the top, "WARNER GEAR CO." in the center, and "MUNCIE, INDIANA" at the bottom. The parts include a large gear assembly on the left, a motor unit on the right, a steering wheel in the center, a large gear and a smaller gear at the bottom right, and a large gear housing at the bottom. A banner across the center reads: "The VALUE of our PRODUCT is not in the PRICE but in the SERVICE RENDERED". At the bottom, a large gear housing is shown with the text "One of the Fundamentals of Modern Motor Car Construction" inside it.

The VALUE of our PRODUCT  
is not in the PRICE  
but in the SERVICE RENDERED

One of the Fundamentals of  
Modern Motor Car Construction

WARNER GEAR CO.  
MUNCIE, INDIANA.



**Platt & Washburn**  
**Refining Co.**  
Incorporated 1885

**PENNSYLVANIA**  
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for

**MOTORS**

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At the CHICAGO SHOW  
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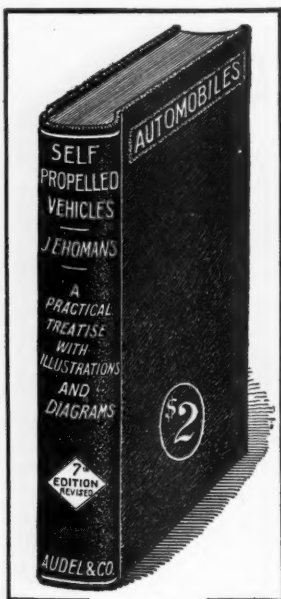
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Space 500

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**New York**





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A practical treatise on the theory, construction, operation, care and management of all forms of automobiles, with upwards of 500 illustrations and diagrams, giving the essential details of construction and many important points on the successful operation of the various types of motor carriages driven by steam, gasoline and electricity. This is probably the best comprehensive treatise published in simple language, so that the contents may be readily understood by the intelligent reader, especially if he has a machine to which he can refer for demonstration of many points discussed. For one who desires to understand automobiles, it is an excellent work to begin with before going deeper into the subject along highly specialized lines. Size,  $5\frac{1}{2} \times 8\frac{1}{2}$ . Pages, 652. With drawings and half-tones.

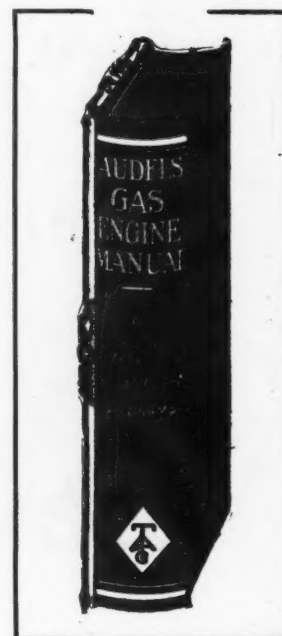
OF ALL THE BOOKS published relative to the automobile industry, the two illustrated and described on this page have proved deservedly popular and among the best sellers.

They cover the subject thoroughly, are well illustrated and printed in good readable type. The price of each volume is \$2.00, and is sent postpaid at that price.

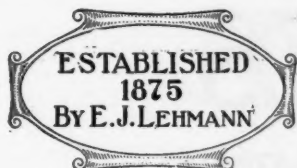
Address the Class Journal Co., 910 S. Michigan Avenue, Chicago.

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## THAT GET THE BUSINESS



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SC	2 "	2600	<b>1900</b>
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HU	3 $\frac{1}{2}$ "	3500	<b>2500</b>
K	5 "	4250	<b>2750</b>
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1	1000 lbs.	\$1400	<b>\$1200</b>
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3	3000 "	1700	<b>1450</b>
4	4000 "	2000	<b>1650</b>
6	6000 "	2300	<b>1900</b>
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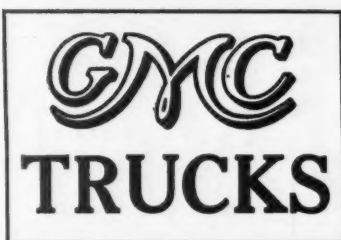
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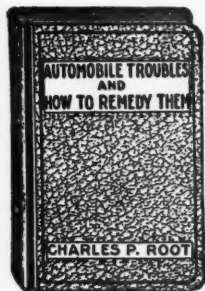
Correspondence invited.

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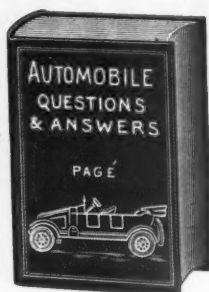
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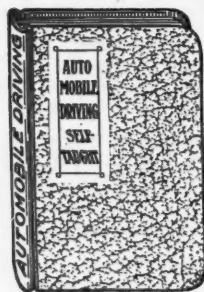




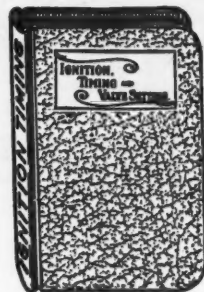
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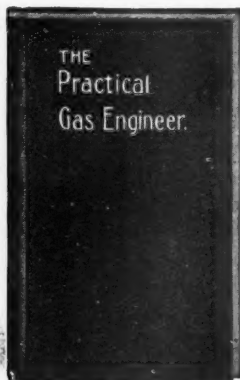
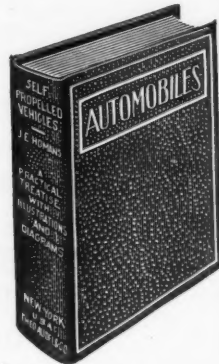


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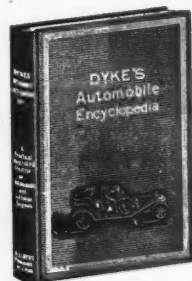


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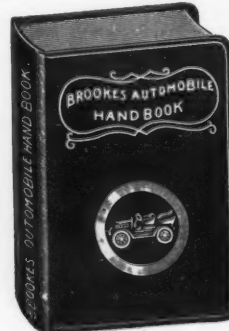
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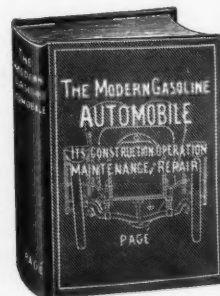
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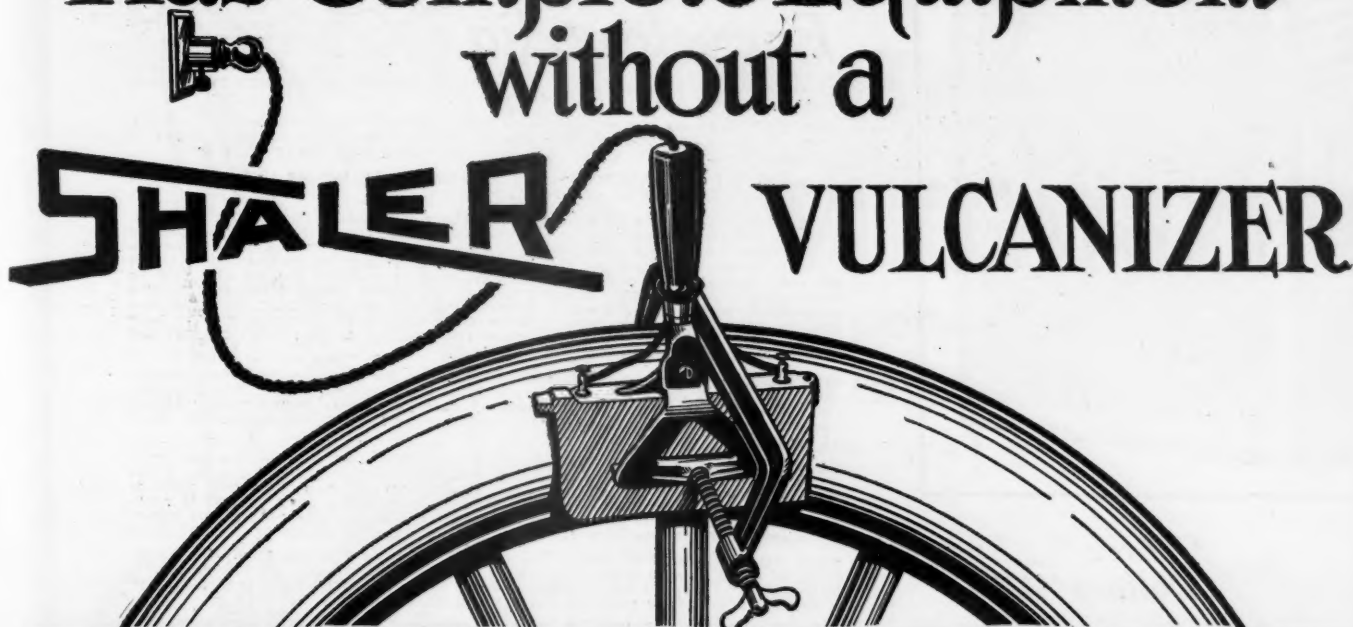


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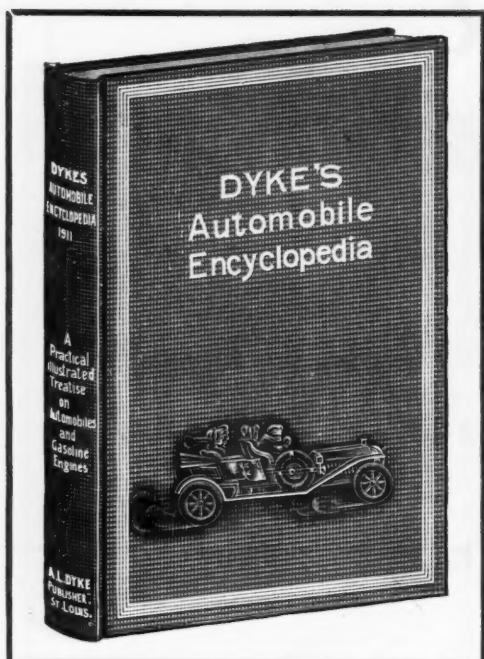
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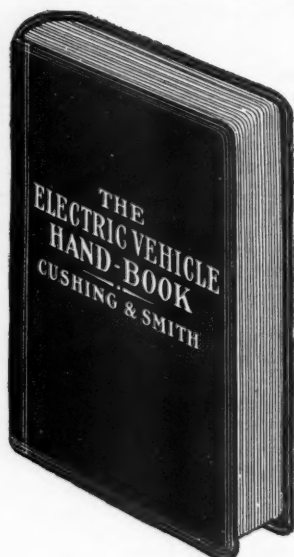
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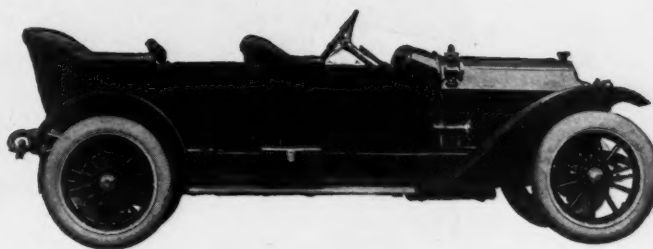
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### Remarkable Record for Consistency

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"Cooper drove a Stutz in this campaign and naturally, therefore, the companion title—that of Champion Car for the year—belongs to the Hoosier concern manufacturing **'The car that made good in a day'—the Stutz.**

"A record fully in keeping with that of Cooper belongs to the Stutz, which started fifteen times, winning seven firsts, three seconds and one third, and being unplaced only four times. In two of these four times the Stutz won the race anyway. The Stutz has made a remarkable record for consistency.

"It is all the more remarkable that the seven firsts were consecutive victories, a record never before achieved by any make of car in the history of the world's road racing.

"It started fifteen times and only four times was it out of the money. In six of the fifteen starts the Stutz averaged better than 70 miles an hour, its fastest performance being 75.03 miles per hour, at Corona."

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Four-Cylinder Touring, \$2150  
Four-Cylinder Roadster, 2000

Six-Cylinder Touring, \$2400  
Six-Cylinder Roadster. 2250

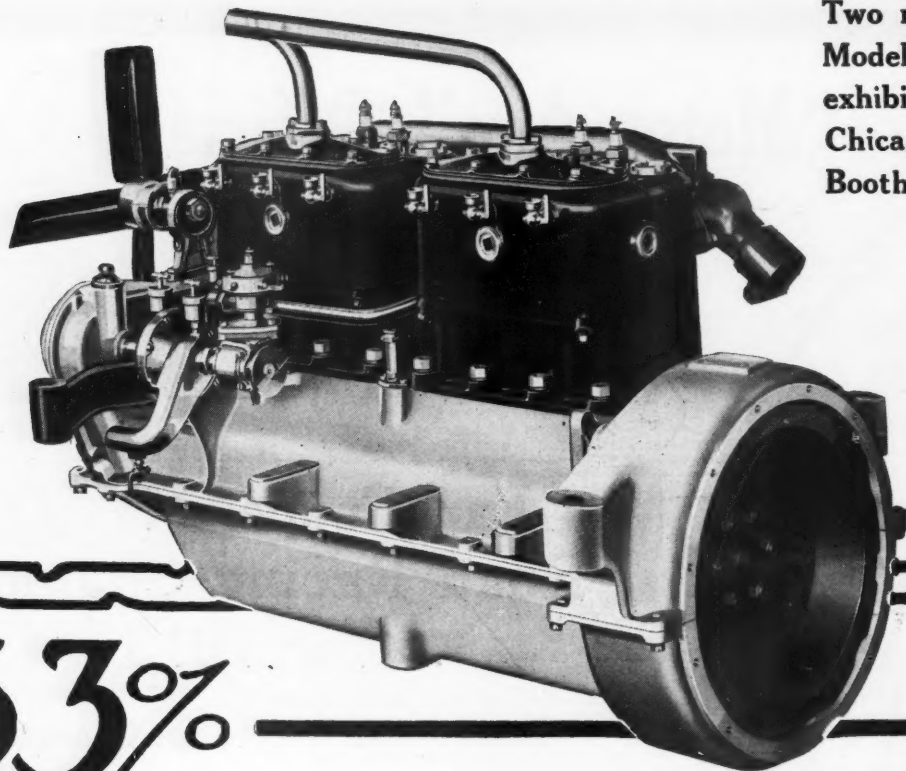
**Stutz Motor Car Company of Indianapolis**

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We will take on a few more dealers with whom we are willing to make a liberal contract. Write or wire quick.



Two new Continental  
Models will be  
exhibited at the  
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Booth 40—Coliseum



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\* There are profound reasons for this 53% increase—reasons no worthy manufacturer, for his own sake or his dealers', can afford to sidestep. Reasons we are ready, upon invitation, to lay before any Engineer, any Manager, or any Board of Control.

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**HUPP MOTOR CAR COMPANY**  
1228 Milwaukee Ave., Detroit, Mich.

"32" Touring Car or Roadster  
\$1050 f. o. b. Detroit

*In Canada, \$1230 f.o.b. Windsor Factory.*  
EQUIPMENT—Electric horn; rain vision, ventilating windshield; mohair top with envelope; inside quick adjustable curtains; speedometer; cocoa mat in tonneau; gas headlights; oil side lamps; trimmings, black and nickel.

With regular equipment and additional equipment of two-unit electric generator and starter; electric lights; oversize tires, 33x4 inches; demountable rims, extra rim and tire carrier at rear. \$1200 f. o. b. Detroit.

*In Canada, \$1380 f.o.b. Windsor Factory.*



## The Car of the American Family

*When Writing to Advertisers, Please Mention Motor Age.*



# This Delivery Car Just Suits Your Local Demand, Mr. Dealer



## The Commerce Delivery Car

**T**HE dealer who knows where the money in this business is to be found is on the lookout for a delivery car of about 1000 pounds capacity, low enough in first cost and upkeep to appeal to all classes of retail stores, from the small merchant to the large department store. There is perhaps a surfeit of heavy trucks for the number required, but when it comes to the smaller business car, there is a tremendous, latent as well as active, demand which has never been satisfied. Wise dealers are rapidly taking advantage of this situation.

The delivery car business received a set-back several years ago, due to the failure of hastily converted pleasure car models and remodeled second-hand touring cars which were unable to do the work required of them. Now that the error of such practice has been recognized, merchants are demanding a real business vehicle, designed for this purpose exclusively. They want a car that will do the work, at a price which allows the merchant a reasonable profit on the investment.

In view of the demand, a well organized delivery car department is now a necessity for every up-to-date motor car selling agency. It converts the dull winter months into an active selling season and enables the dealer to carry a complete organization with profit the year around. One or two good salesmen with one demonstrator can go after the merchants in your locality with a business-like campaign that is sure to produce results and build up a profitable business.

The Commerce Car is the ideal delivery car of its size. Besides meeting the demand in capacity and price, it stands up to hard work in a way that means permanent satisfaction for the owner and permanent business for the dealer. It is simple and foolproof, fast, powerful, economical, reliable and durable. It has been in successful use for three years.

1000 pound capacity, 25% overload, guaranteed.  
Equipment, including electric horn complete.  
32 x 3 1/2 Goodyear pneumatic tire, or—  
34 x 2 1/2 Goodyear Motz truck tire.  
Express body, full panel, or canopy top.  
Clear floor space, 64 inches long.

42 inches wide, 52 1/2 inches high.  
Gear ratio 6 to 1 on high.  
Gear ratio 20 to 1 on low.  
Friction drive.  
Wheelbase 102 inches.  
Price \$975 with body.

We want to get in touch with reliable established dealers or business men who are capable of conducting a selling agency for Commerce Cars along modern business lines. Any man with ability, with a reasonable amount of capital, can make a profitable business or department of this agency and we can prove it. Will you risk a two cent stamp for our proof? Write today.

Administration Dept.

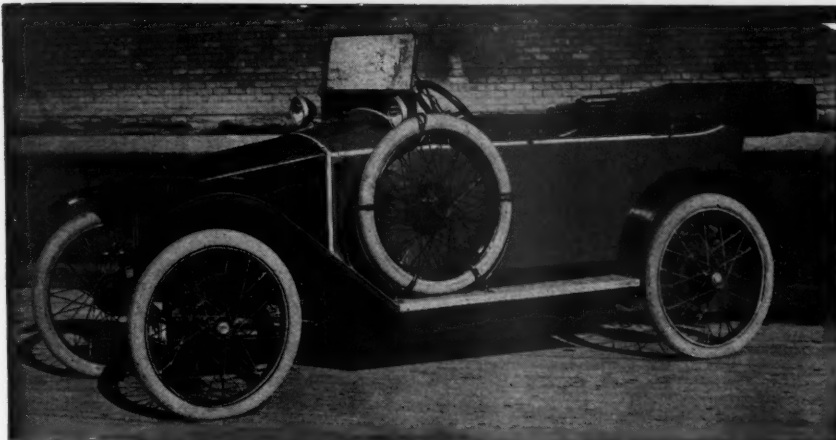
**The Commerce Motor Car Co.**  
625-29 Penobscot Building  
**DETROIT MICHIGAN**

When Writing to Advertisers, Please Mention Motor Age.

**COMMERCE MOTOR CAR CO., 625-29 Penobscot Bldg., Detroit, Mich.**  
Gentlemen: Please send me, without obligation, your analysis of the Delivery Car Situation and facts about the Commerce Car.  
Dealer .....  
Address .....



# Keeton and Car-Nation Attract Largest Crowds at New York Show



**\$520 4-Passenger CAR-NATION Touring Car \$520**

## CAR-NATION SPECIFICATIONS.

**Unit Power Plant**—Motor—4 cyl., en bloc, 3 1/2 x 3 1/2, "L" head—large valves and bearings. Very quiet and powerful.  
**Ignition**—Magneto—Fixed spark.  
**Lubrication**—Constant level splash—plunger pump.  
**Carburetor**—Approved type—very economical.  
**Cooling**—Thermo syphon. V-shaped radiator—adjustable belt-driven fan.  
**Clutch**—Multiple steel disk type running in oil.  
**Transmission**—Selective type, 3 speeds forward and reverse—one lever control.  
**Drive**—Bevel gear through concentric torque tube with one universal joint.  
**Rear Axle**—Semi-floating type. Hyatt roller bearings.

**Brakes**—Emergency, internal exp. on 10" drum on rear wheels. Service external contracting on transmission shaft.  
**Wheels**—Detachable wire—30x3 clincher rims and smooth tread tires.  
**Control**—L. H. drive, center control.  
**Wheelbase**—104".  
**Tread**—48".  
**Standard equipment**—Horn—Head lamps and tail lamp with set of tools.

## PRICES

Model A—2 Pass. Roadster.....\$495  
 Model B—2 Pass. Tandem Type.....510  
 Model C—4 Pass. Touring Car.....520  
 Extra Equipment: Top, \$25; Windshield, \$10

## CAR-NATION

*"The Car for the Nation"*

The Car-Nation is just what the name implies—the car for the nation. The price brings it within the reach of the great majority—its appearance appeals to the man who is a discriminating buyer—its mechanical construction and economy in use assure a lasting, endurance, and low cost of up-keep.

The Car-Nation is more than a cyclecar; that is, it has all the good points of a cyclecar—light weight, snap, low initial and upkeep cost, etc.—in addition to having all the tried and proven features of the high-grade, expensive motor cars, which the cyclecar does not have.

The small car is here to stay; a glance at the Car-Nation booth at the Grand Central Palace Automobile Show in New York would have convinced the most skeptical. Wise dealers will cash in on this widespread interest by getting in touch with us at once.

## A Harmony of Motion

You cannot fully realize the meaning of the phrase "Harmony of Motion" until you have a ride in the new "Six-48" Keeton.

All the working parts perform their duties in a quiet and business-like manner that is the most convincing proof of the excellence of the mechanical construction.

The quiet elegance of the color combinations which seem to be peculiarly adapted to the French type of construction attract the attention of the most fastidious buyers.

Dealers who are looking for a car that embodies the best



ideas of Europe with the economical prices of America will get in touch with us at once.

## KEETON SPECIFICATIONS

**Motor**—Six cylinder, 4" bore, 5" stroke, cast en bloc, "L" head.  
**Ignition**—Elsemann Dual High Tension Magneto, Automatic Spark Advance.  
**Electric Starting, Lighting**—"Jesco" Starting and Lighting System, single unit type.  
**Cooling**—Centrifugal Pump and powerful fly-wheel fan insure ample cooling.  
**Front Axle**—Elliott type, ball thrust bearing in yoke head.  
**Rear Axle**—Full floating type, gear ratio 3 1/2 to one. Imported annular bearings.

**Brakes**—Brakes cam actuated, internal expanding, large diameter.  
**Control**—Left side drive, right hand control.  
**Steering**—Worm and full Gear Type with thrust bearings, 18" or 20" walnut wheel.  
**Clutch**—Cone shaped steel discs running in oil, housed in fly wheel.  
**Transmission**—Selective type, 4 speeds forward and reverse, direct on third, imported bearings.  
**Wheels**—Five interchangeable wire wheels 34" in diameter, 4 1/2" tires.  
**Speedometer**—Warner Autometer with clock combination.  
**Horn**—Klaxon.  
**Tire Pump**—Mechanically operated, two cylinder compressor.  
**Wheel Base**—136".  
**Equipment**—Especially detailed and complete.

## PRICES—F. O. B. DETROIT.

2 Passenger Roadster, completely equipped.....\$3250  
 7 Passenger Touring Car, completely equipped.....3250  
 A full line of open and closed bodies.  
 Write for the "Triple Test" booklet.

Manufactured  
by

**THE AMERICAN VOITURETTE CO., Detroit, U. S. A.** See our Exhibits at CHICAGO

When Writing to Advertisers, Please Mention Motor Age.





## The Marmon "Forty One"—\$3250

### Marmon "Forty One"

Six-cylinder engine, 41 to 70 horse power, a marvel of velvety smoothness and silent power. An improvement on the famous automatic, force feed, oiling system originated and developed on Marmon cars eliminates noise by valve mechanism operating in circulating oil bath. 132-inch wheelbase. Three-point support for both engine and transmission. Straight line shaft drive and full floating rear axle. 25 gallon gasoline tank and tire holder mounted on frame in rear. Electric starting, lighting, horn, power tire pump and equipment for every requirement. Touring Car for five or four passengers, Roadster or Speedster, \$3,250.00; f. o. b. factory, Indianapolis.

A remarkable, medium-sized six-cylinder car of ample capacity and power to take you over the most difficult roads and grades in comfort—

A car that throttles down to a crawl or goes at breathless speed without gear shifting—

A car of beauty with every convenience and luxury known to motordom—and not a few that have been heretofore unknown—

In all, a car of Marmon quality—the highest expression of real automobile value.

*Marmon Cars are on display  
at Space G-2, Coliseum,  
Chicago Automobile Show*

### Marmon "48"

Six-cylinder, 48-80 h.p., 145-in. wheelbase with short turning ability, eliminating the old objections to long wheelbase. Body types and equipment to meet every requirement. The only big car with small car advantages. Wonderful riding qualities and surpassing power and flexibility. A car developed by years of thorough tests to meet every demand of the exacting buyer.

### Marmon "32"

Four-cylinder, 32-40 h.p., 120-inch wheel-base, body types and equipment to meet every requirement. A rational, logical car for touring and city use. Years of satisfactory service have proved its economy in tires, fuel and upkeep—plus smooth, delightful operation and durability.

## Nordyke & Marmon Co.

INDIANAPOLIS (Established - 1851) INDIANA



*Sixty Years of Successful Manufacturing*

*When Writing to Advertisers, Please Mention Motor Age.*



# SPICER UNIVERSAL JOINTS

"SPICER" Quality is  
recognized as  
standard on  
American Cars



**Oil Tight—  
Dust Proof**

**Parts Interchangeable**

THE SPICER UNIVERSAL JOINT is accepted as the most dependable flexible connection known to motor car practice and is the universal equipment for high-grade cars.

All drop forgings used by us are made in our own plant and we, therefore, control absolutely the quality of steel in our product.

All parts accurately machined to gauge and bearing surfaces case-hardened and ground.

Highest standards of inspection maintained.

**SPICER MANUFACTURING CO., Plainfield, N. J.**

**SALES REPRESENTATIVES**

K. FRANKLIN PETERSON,

122 So. Michigan Blvd., Chicago

L. D. BOLTON,

2215 Dime Savings Bank Bldg., Detroit

THOMAS J. WETZEL, 17 West 42d St., New York

**EXPORT**

BENJAMIN WHITTAKER, 21 State St., New York





## Live at the Hotel McAlpin

**W**HEN you come to New York you naturally are interested above all else in deciding where to live.

The Hotel McAlpin extends to its guests the luxurious, home-like accommodations and facilities possible only with the largest and safest hotel in the world—wonderfully organized and conducted on the highest plane of service—at prices notable for their moderation.

Its surroundings are distinctive in character—its service exceptional—its appointments unusually complete—its restaurants and cuisine unexcelled—and its prices are those you have always wanted to pay for the highest grade of accommodation.

Location ideally central—Broadway and 34th Street—in the midst of the big shops and amusement district—within one block of the Pennsylvania Terminal—a short walk from Grand Central station.

Management of MERRY & BOOMER

# HOTEL McALPIN

*Herald Square*

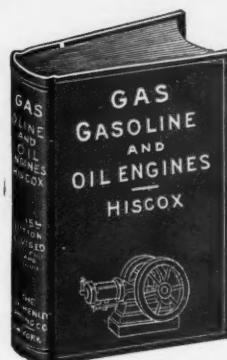
## NEW YORK

*Nearer than Anything to Everything*



# GAS, GASOLINE and OIL ENGINES

INCLUDING GAS PRODUCER PLANTS



Sixteenth edition.  
Revised, enlarged and reset.

By  
**GARDNER D. HISCOX**  
M. E.

Author of  
"Mechanical Movements,"  
"Compressed Air,"  
Etc., Etc.

**Price, \$2.50**

Charges Prepaid



HE only complete American book on the subject for Gas Engine Owners, Gas Engineers, and intending purchasers of gas engines, treating fully on the construction, installation, operation and maintenance of gas, gasoline, kerosene and crude petroleum engines.

The new rewritten, enlarged and revised 16th edition of this work has been prepared to meet the increasing demand for a thorough treatise on the subject. Its 450 pages give general information for everyone interested in this popular motive power, and its adaptation to the increasing demand for a cheap and easily managed motor requiring no licensed engineer. It is fully illustrated by 351 Engravings and Diagrams.

### CONTENTS.

Introduction. Theory of the Gas and Gasoline Engine. The Utilization of Heat and Its Efficiency in Explosive Motors. Retarded Combustion, Wall-Cooling and Compression Efficiencies. Compression in Explosive Motors, and Its Work. Causes of Loss and Inefficiency in Explosive Motors. Economy of the Gas Engine for Electric Lighting, etc., etc. The Material Power in Explosive Engines. Carburetors. Cylinder Capacity of Gas and Gasoline Engines. Governors and Valve Gear. Explosive Motor Ignition. Cylinder Lubricators and Mufflers. Construction Details and Parts of the Explosive Motor. Explosive Motor Dimensions. Types and Details of the Explosive Motor. The Measurement of Power. Management of Explosive Motors. Explosive Engine Testing. The Amateur's Motor, Marine Motors, Motor Bicycles, Tricycles and Automobiles. Kerosene Distilling and Petroleum Oil Motors. Producer Gas and Its Production.

## The Class Journal Company

910 S. Michigan Avenue Chicago





**Motsinger**  
Carburetor increased mileage guaranteed

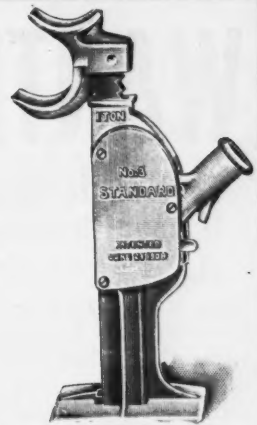
**A Great Little  
Mixer-Friends  
Everywhere!**

See us at the Chicago  
Show-Coliseum Gallery  
Space - 32

**Motsinger Device Mfg. Co**  
875 Putnam St., Lafayette, Ind.  
CHICAGO DISTRIBUTORS  
RHODES & PETERSON, 119-121 E. SIXTEENTH ST.



STANDARD JR.



STANDARD NO. 3

## STANDARD Automobile Jacks

STANDARD JACKS have kept pace with the development of the automobile from its beginning, and have been supplied, year after year, as regular equipment by some of the largest and most prominent makers of high-grade motor cars.

STANDARD JACKS ARE MADE UNDER OUR OWN PATENTS AND FOR SIMPLICITY, DURABILITY, SMOOTHNESS OF ACTION AND RELIABILITY ARE UNEQUALLED.

With the best facilities and an enormous output, we are in position to meet every requirement.

SATISFACTORY GOODS AND SATISFACTORY SERVICE GUARANTEED.

STANDARD JACKS ARE MADE IN ALL SIZES, AT ALL PRICES, FOR ALL REQUIREMENTS. WRITE FOR CATALOGUE.

**National Standard Company**  
Niles, Michigan

CHICAGO OFFICE

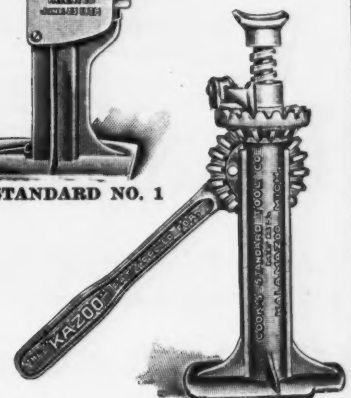
180 North Market Street



STANDARD JR. NO 2



STANDARD NO. 1



THE "KAZOO"



# WANTED DEALERS JOBBER

**To Handle Spark Plugs Which Are  
Unconditionally Guaranteed for Life**

Every plug or set of plugs sold to the user is backed up by an iron-clad legal guarantee signed by the Long Distance Spark Plug Co., which entitles the holder to exchange defective or broken plugs. If any plug goes wrong from any cause whatsoever, whether by accident or otherwise, we will give a new one in exchange.



Licensed under Canfield  
Patent No. 612,701

## Improved Long Distance Spark Plugs

are quick sellers. They sell for \$1.50 each but are cheapest in the long run. First cost—only cost. Put up in attractive package for counter display. Good margin of profit for both dealer and jobber. Most motorists buy full set of four in order to get one plug free. Dealers and jobbers are requested to write for our special 1914 proposition. Electrotypes for use in your catalogue furnished free.

### \$5000

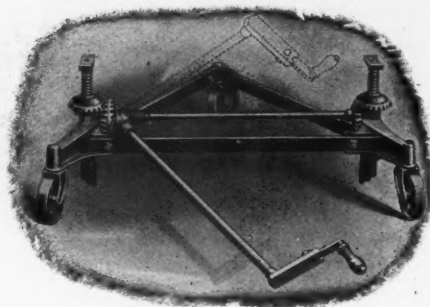
**In Prizes to be Divided  
Among Retail Dealers**

With every set of Improved Long Distance Spark Plugs sold the dealer is privileged to take in four old plugs and allow 25 cents each for same. To the dealers who take in the greatest number of old plugs by January 15, 1915, a prize of \$1,000 will be given. Smaller prizes totaling \$4,000 will be apportioned to other dealers. Every dealer who hustles stands a good show to win big rewards in addition to big profits. In case two or more dealers take in the same number of old plugs that would entitle them to one of the prizes, such prize and the next lower prize will be added, and be equally divided between them. Address for full details,

**Long Distance Spark Plug Co.**  
212 South Illinois St., Indianapolis, Ind.

**To Car Owners:** Ask your dealer to show you these improved Long Distance Spark Plugs. If he cannot supply you, we will send one post-paid on receipt of \$1.50 or five for \$8.00. If full set of four is ordered, we will take in four old plugs, regardless of condition and allow 25 cts. each for same, making total cost for five plugs \$5.00.

# WEAVER Auto Twin-Jacks



## At the Chicago Show

**YOU** will have a chance to see and operate "that three-wheel Weaver Jack" while at the Show in Chicago.

If you have ever entertained any doubts as to the money-making qualities of Weaver Auto Twin-Jacks, take advantage of this opportunity to convince yourself:

They save tires, labor, time and energy for the man who takes care of his own car.

They save floor space, wages, time and labor for the man who operates a public garage, repair shop, paint shop or storage room.

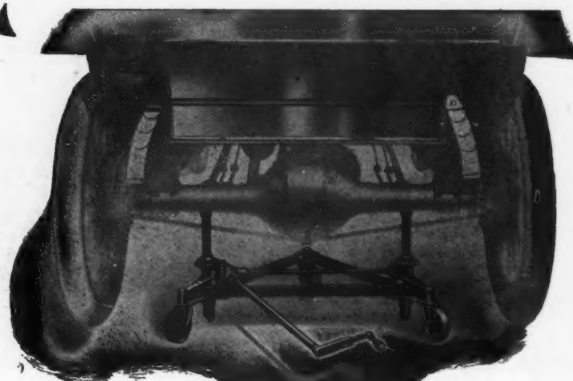
Everyone who is interested in automobiles is interested in "Weaver Jacks."

### TWO for \$20

(One for each axle)

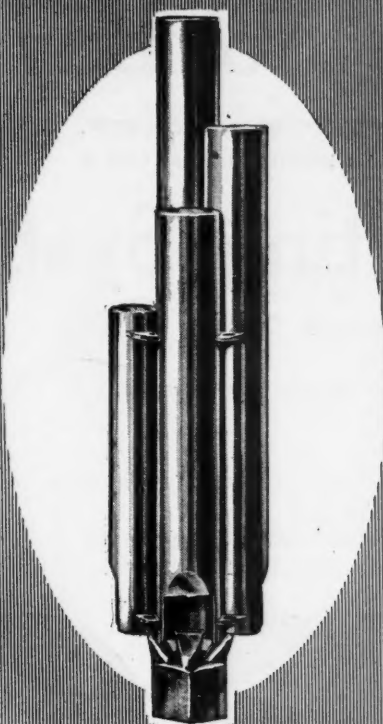
LIBERAL DISCOUNTS TO DEALERS

**Weaver Mfg. Co.**  
2161-69 So. 9th St., Springfield, Illinois



When Writing to Advertisers, Please Mention Motor Age.





## The AERMORE Exhaust Horn

Not one penny's worth of upkeep expense connected with its use. No batteries or troublesome wiring to bother with. No delicate mechanism to get out of order. No ratchets to wear or grind. The AERMORE utilizes the waste product of a car—the exhaust. The first cost of an AERMORE is final.

The AERMORE is a musical horn. It is as polite as it is insistent. It never defeats the purpose of a good signal by **frightening**. A horn that frightens increases rather than diminishes the likelihood of accident.

Attaches to the exhaust pipe. Made of brass tubes heavily nickel-plated. No complicated parts. Operates by foot-pedal. Very easy to install. Comes with all fittings ready to be put on car.

**For Ford Cars—Aermore "Special" \$5.50**

No. 1—15" size for 40-60 H. P. cars.....	\$10.00
No. 2—12" size for 30-40 H. P. cars.....	9.00
No. 3—11" size for 25-30 H. P. cars.....	8.00
Motorcycle size .....	5.50

Descriptive literature on request. Liberal discounts to Dealers. Address Dept. M

**THE FULTON COMPANY**  
Milwaukee Wisconsin

## This Attractive Poster In Eight Colors

with an inflation table, showing the air pressure recommended by fifty-two tire manufacturers, will be

### Sent Free

to all jobbers, dealers and garages making formal request for same before February 15th.

## SCHRADER UNIVERSAL TIRE PRESSURE GAUGE



"Keep the pressure right."

PRICE ONE DOLLAR.

Address, stating the number desired, to Dept. F.

**A. Schrader's Son, Inc.**

786 Atlantic Ave.

Brooklyn, N. Y.



# Frankly—I'm Looking for Buyers

I want every automobile owner who has to get out in the snow, and rain, and slush to light his gas lamps, to install on his car a

## Fisher Electric Lighting System

*Keeps Your Batteries Charged*

We have only one operating instruction—"Turn the Switch"  
(Needn't leave the seat)

The Fisher Electric Lighting System is so simple that anyone with ordinary intelligence and a little mechanical ability can install the system.

There are no intricate parts, no difficult wiring, no technical instructions. There are no governors, springs, regulators, or other devices to get out of order. We send a simple and understandable diagram.

# \$37.50

For the convenience, cleanliness, safety and reliability of Fisher Electric Lights

### Never Had to Replace a Part

The Fisher Outfit has been on the market for over two years and we have never had to replace a single part—not even the brushes or springs.

#### THE TECHNICAL REASONS WHY

Operates at crank-shaft speed—full voltage at about 300 r.p.m.

Does not use rheostat, regulators, governor or clutch.

Automatic Regulation from 300 to 2,000 r.p.m. May be driven by either couplings, gears, or fan belts.

Weight only 24½ pounds.

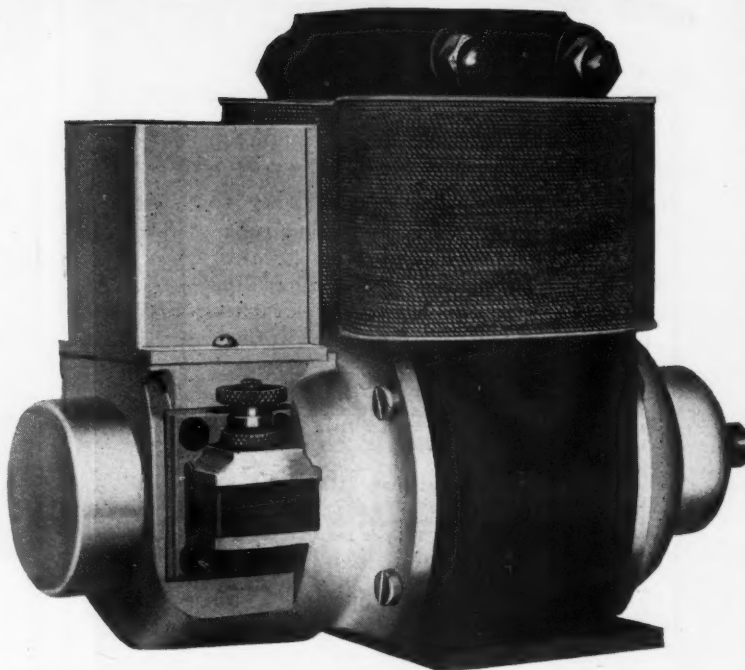
Fixed point of commutation. Brushes accessible.

Armature (only moving part) floats on ball bearings. Can be applied to any standard car.

Keeps your battery charged.

Solves immediately, economically, and efficiently the lighting problem.

*Write for Catalogue  
and Names of Users*



**Fisher Electrical Works** 1500 West Larned St.  
Detroit, Mich.

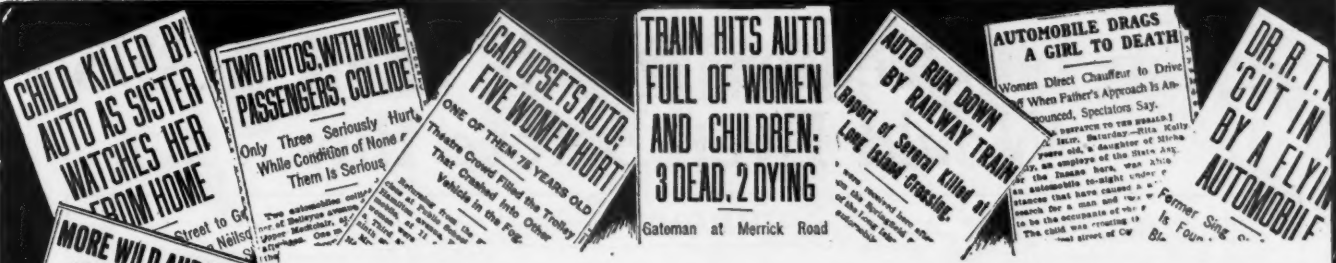
#### DEALERS

**Note.**—There are over 800,000 cars without electric lights. Consider the possibilities in a reliable outfit selling at this low price—and then write us for territory and dealer's prices. Our proposition will interest you.

# \$37.50

COMPLETE WITH ZERO CENTER LINE  
AMMETER AND LIGHTING SWITCH





## Avoid Dangerous Collisions!

Hundreds of persons are killed or injured, and thousands of dollars wasted on repairs every year by automobile collisions that are due to inability of ordinary brake linings to stop cars quickly in emergencies. Accounts of serious collisions, such as are here shown, can be found in the newspapers almost daily.

Could you depend on your brake lining to stop your car quickly if danger suddenly loomed up only a few feet ahead?

No matter how fast you speed, you are always absolutely safe in relying on the brakes to lock the wheels of your car almost instantly, if lined with

## J-M NON-BURN BRAKE LINING

This lining is made of Asbestos, reinforced with fine brass wires, which means a mineral lining against a metal drum—the greatest braking efficiency known.

Yet, with a slight pressure on the brakes, this lining will stop a machine as slowly as desired.

Tests also show that J-M Non-Burn outwears at least twelve ordinary linings. Frictional heat cannot burn or char it; oil, gasoline or water cannot affect it.

Insist on seeing the name "J-M Non-Burn" on your lining. Don't take chances with cheap substitutes. Sold by all first-class dealers.

A copy of the autoists' hand book "Practical Pointers on the Care of Brakes" sent on request. Write our nearest House.

### H. W. JOHNS-MANVILLE CO.

(1376)

Albany  
Baltimore  
Boston  
Buffalo

Chicago  
Cincinnati  
Cleveland  
Dallas

Detroit  
Indianapolis  
Kansas City  
Los Angeles

Louisville  
Milwaukee  
Minneapolis  
New Orleans

New York  
Omaha  
Philadelphia  
Pittsburgh

San Francisco  
Seattle  
St. Louis  
Syracuse

THE CANADIAN H. W. JOHNS-MANVILLE CO., Limited, Toronto, Montreal, Winnipeg, Vancouver



J. HANZ-QU. 20.

## BARNES

### No. 2 Adjustable Arbor Press

### Price \$100.00

Distance between Screws, 20 inches

" " Head and table, 36 inches

Capacity, 50 Tons

Weight, 870 lbs.

This exceedingly convenient press is designed for use in garage machine shops for pressing shafts into and from pulleys, gear wheels, hubs, etc., and for straightening automobile shafts. The engraving shows the construction and principle of operation of the machine very distinctly. From the table rise two screw guides, upon which the cross-head is adjustably supported, having two semi-screw nuts and toggle mechanism by which the cross-head is held fast or released for vertical adjustment. The cross-head is balanced by weights, as shown, and a steadying bar connects the press cup with the press screw. On the press screw is fixed a spur-toothed ratchet wheel embraced by a forked lever head fulcrumed to oscillate on the press screw. A double acting spring pawl engages the teeth of the ratchet, and to the press screw a hand crank is fixed.

After the object has been placed in press the cross-head in which the central screw is placed can be instantly dropped to the work, and with a few turns of the screw the required pressure is applied. An important saving in time is thus effected, as compared with the method heretofore followed of placing a quantity of blocks on the bed plate, or running a long screw up and down until it reached the material to be pressed.

— Manufactured by —

**W. F. & John Barnes Company,** 444 Ruby St. ROCKFORD, ILL.



# A Car of Greater Worth Than \$1195 Would Ever Before Buy

Westinghouse Electric Starting System  
Westinghouse Electric Lighting System  
Motor Driven Tire Pump  
Unit Power Plant  
Long Stroke Motor Left Side Drive

## Equipment

Stream Line Body—Concealed Hinges  
Enclosed Valves Center Control Levers

Gasoline Tank under Cowl Dash  
Demountable Rims  
Floating Rear Axle with Pressed Steel Housing  
Goodyear No-Rim-Cut Oversize Tires  
114 Inch Wheel Base

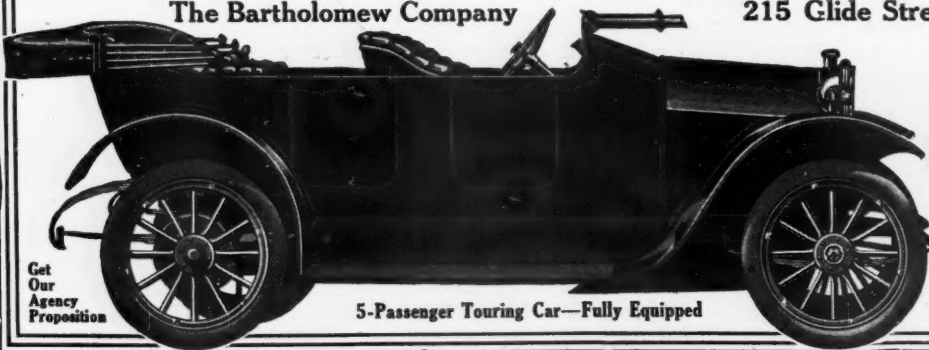
In all the 31 years of its existence, the company behind this Model 30 has never been "re-organized." It is a *stable* Company. Since 1882 it has stood for the highest standards of manufacture. Its automobile product is just as substantial as its business policy—which has always been to give *more* than the price asked demands.

The Model 30 is a car of maximum value

at a minimum figure. Factory equipment and efficiency have enabled us to reduce production cost—and the individual buyer *profits* thereby. In appearance—equipment—construction—from *every* standpoint of car excellence this Model 30 is a *good* car at a *low price*. Dealers will do well to learn more about this \$1195 automobile—also about our Model 36, selling at \$1840. *Please write for catalogs.*

The Bartholomew Company

215 Glide Street, Peoria, Illinois



5-Passenger Touring Car—Fully Equipped

*Glide*

Model 30

Get  
Our  
Agency  
Proposition

## ZENITH CARBURETORS

Are the carburetors used exclusively by DeDion-Bouton, Mors, Darracq, Rochet and 30 other French makes, the carburetor for you?  
They are all **ZENITH**-equipped.

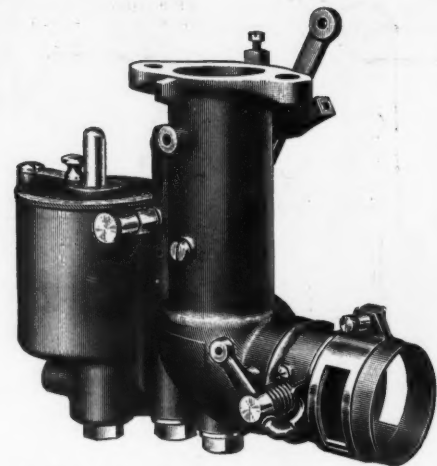
Are the carburetors found on the Argyll, Calthorpe, Vauxhall and 12 other English makes, the carburetor for you?  
They all use **ZENITH**.

Are the carburetors used by the Metallurgique and 8 other Belgium cars, your carburetor?  
They are all **ZENITH**-equipped.

Are the carburetors exclusively used by the Benz, and 19 other German makes, the carburetor you want?  
They are **ZENITH**.

Are the carburetors found on the Laurin-Klement and 5 other Austrian cars, the carburetor for you?  
They are **ZENITH**.

**ZENITH** carburetors are also used on the Isotta-Fraschini and 5 other Italian makes and are found on a score of American makes as standard equipment, and may be attached to any car.  
The carburation standard of the world.



**ZENITH** CARBURETOR COMPANY, Detroit, Mich.

### AGENTS:

Mercedes Repair Company, 159-161 E. 54th St.,  
New York.  
Motor Parts Co., No. 185 Columbus Ave., Boston,  
Mass.  
Motor Parts Co., No. 818 North Broad St., Phila-  
delphia, Pa.  
Fawkes Auto Company, Minneapolis, Minn.  
Rene J. Marx Company, No. 1902 Geary Ave.,  
San Francisco.

## ZENITH CARBURETORS



# ACME TORSION SPRINGS

"DONT  
JOUNCE"



"DONT  
BOUNCE"

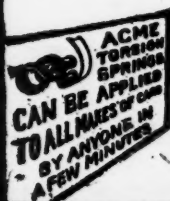
**GUARANTEED TO MAKE YOUR FORD**

**The Easiest-Riding Car in the World**

Could we make a stronger guarantee? And notice it is not a mere claim—it is a positive guarantee.

WHY? Because ACME TORSION SPRINGS are based on SCIENTIFIC PRINCIPLES, properly applied. ACME TORSION SPRINGS, the only practical device on the market that can act FREE with, and CONTINUOUSLY in CONJUNCTION with the LEAF SPRINGS, any way they are called upon to work, and adjust themselves MECHANICALLY to all conditions.

**We Challenge Contradiction of Our Claims. Get an Expert's opinion.**



**Equip your car with ACME TORSION SPRINGS.**

Insurance for life of occupants, car and easy riding. Don't be fooled by "shock absorbers." What you want is more spring capacity under proper Automatic Control. Acme Torsion Springs add at least 18 feet to the total leaf spring area, every inch adding greater resiliency automatically controlled.

Acme Torsion Springs stop vibration, prevent spring crystallization and breakage, minimize tire and engine trouble, and improve the riding qualities of any car at least 100%. They cost less than half the price of shock absorbers, and are worth several times as much. Eliminate Vibration and you eliminate trouble. We have convinced thousands, let us convince you. N. B.—Acme Torsion Spring Equipment is fully Guaranteed against Defects and Breakage for the life of the car.

Write today for information.

**ACME TORSION SPRING CO., 994 Boylston Street, BOSTON, MASS.**

## GILBERT TIRE COVERS PROTECT

your spare tires against injury  
**FROM WATER, OIL AND DIRT**



Made in all sizes and styles and for all demountable rim and wire-wheel equipment.

Careful manufacture and materials of the highest quality insure your satisfaction.

Insist upon GILBERT GOODS.



**THE GILBERT MANUFACTURING CO., New Haven, Conn.**  
**NEW YORK CITY OFFICE, 2010 BROADWAY**



# What Do You Know About Springs?

**You are entitled to know what spring suspensions are used by pleasure and commercial car manufacturers and the reasons for their adoption.**

Why isn't the spring tapered and supported on both sides?

Where and why do springs break?

What will stop spring breakage?

What will prevent your car from pitching?

Write for booklet, "The Solution of the Spring Problem," which tells the spring story.

## **CLARENCE N. PEACOCK & COMPANY**

Dept. I

1790 BROADWAY, NEW YORK, N. Y.

# Highways of the Future



Time and heavy motor travel have proved the inadequacy of dirt and macadam roads for present day traffic. The highways of the future must be permanent roads—roads that are smooth, dustless, enduring.

Concrete roads give the taxpayer the utmost for his money; are low in first cost, low in maintenance charges, unaffected by weather, unworn by traffic, permanent.

You can hasten the day of good roads in your community by advocating the use of concrete in their construction. Our books on concrete for road building will be sent you on request.

**UNIVERSAL PORTLAND CEMENT CO.**  
CHICAGO - - PITTSBURGH - - MINNEAPOLIS

Plants at Chicago and Pittsburgh  
Annual Output 12,000,000 Barrels

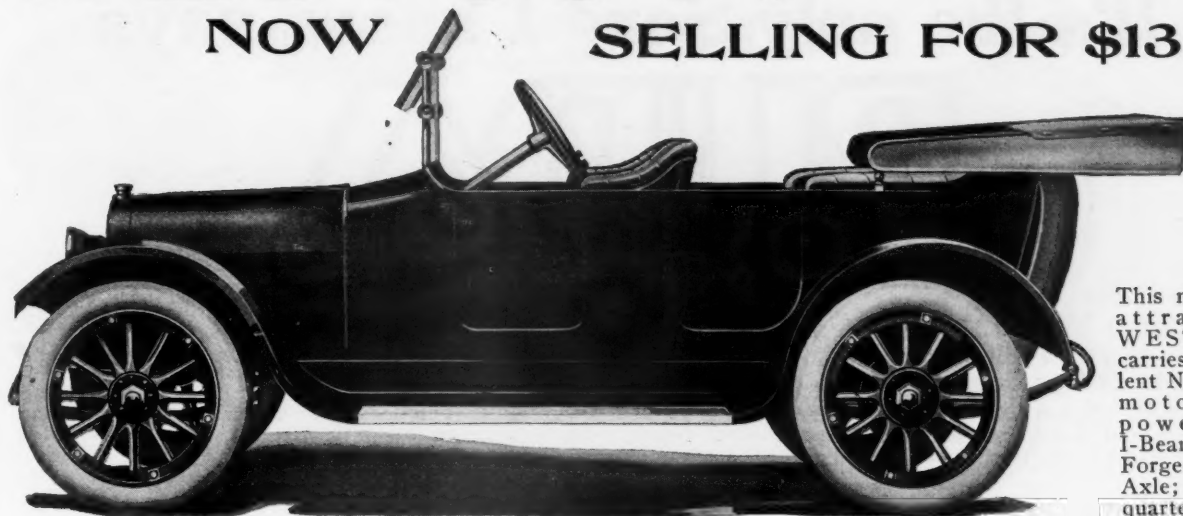


# WESTCOTT

Honor Bound to be  
a Good Car

NOW

SELLING FOR \$1385



This new and attractive WESTCOTT carries the silent Northway motor, unit power plant. I-Beam Drop Forged Front Axle; Three-quarter Floating type Rear Axle. Left Hand Drive, Center Con-

In a Four-Cylinder Five-Passenger Touring Car, as well as Roadster

trol. 113-inch Wheel Base, 33x4-in. Tires. Demountable rims. Ventilating Windshield. Electric Lighter and Starter. This car REIGNS SUPREME, not alone for the material used in its construction, which is of the highest standard, but also for its beautiful Stream Line Body, graceful lines of its Fenders, Finish and Upholstering. This car will be on exhibit in Space No. 5-A, Coliseum Basement, during the Chicago show—January 24 to 31. Will be glad to see you.

See us or write us for our attractive agency proposition.

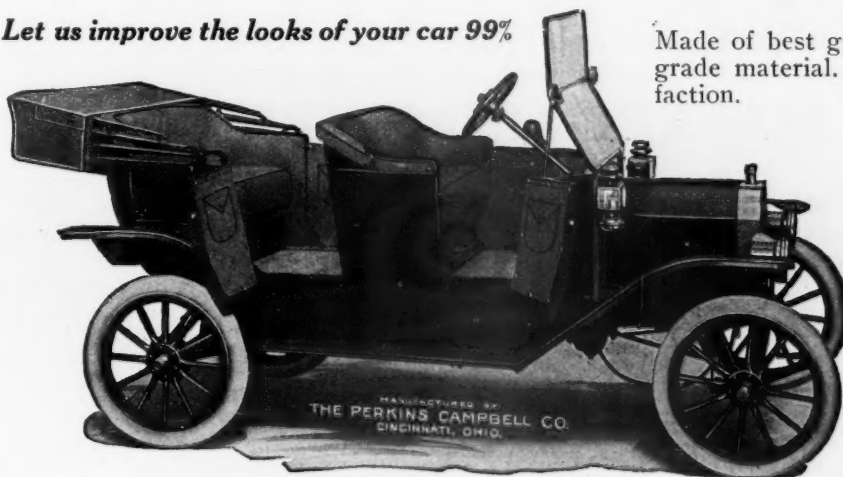
**WESTCOTT MOTOR CAR COMPANY, Richmond, Ind.**

**"CAMPBELL"**  
ACCESSORIES

**Waterproof SEAT COVERS  
FORD ACCESSORIES  
LEATHER GOODS**

**For Autos**

*Let us improve the looks of your car 99%*



Made of best grade of cloth and bound with high grade material. Guaranteed to fit and give satisfaction.

We make covers for Ford, Hup, Hudson, Studebaker, Reo, Paige, Overland, Maxwell, Buick, Cole, Cadillac, and many other cars.

During CHICAGO SHOW, Jan. 24-31

**1514 Michigan Ave.**  
Fulton-McCutchen Bldg.

Be sure to see us. We have something for you.

"FORD" ACCESSORIES—All necessary articles. No common foolishness. Fan Belts, Steering Rod Boots and Leather Goods, License Holders and Metal Goods

**THE PERKINS CAMPBELL CO., 622 Broadway, Cincinnati, Ohio**

SEE OUR AGENTS CONTRACT PROPOSITION

*When Writing to Advertisers, Please Mention Motor Age.*



# Let's Sing a Song o' Silence!

## It's the only Song I know, says

"THE PART THAT  
SELLS THE CAR"

# BUDA

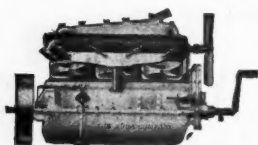
## MOTOR

"THE PART THAT  
SELLS THE CAR"

A silent machine is a well-made machine. Even small, light machinery driven by external power, say sewing machines, will be noisy from the start, if not made with accuracy, or will soon become noisy if not made of the best of good stuff.

What a triumph is it, then to make a machine like the BUDA MOTOR! It produces, from violent internal explosions, its own power to the amount of many horse power. It can, nevertheless, turn hundreds of times in a minute almost without a sound, and it preserves its silence for years, through untold millions of revolutions.

We wish every manufacturer and every owner of a car would ride up a hill on a heavy load behind a BUDA four-year-old, and listen sharply (he'd have to) for the BUDA "Song O' Silence." *Silence isn't everything, but in an old motor it means that everything else is there.*



Model "SS" '3 Buda  
"Little Six"

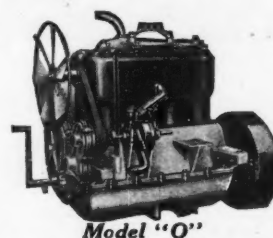
1108 S. MICHIGAN AVENUE, CHICAGO

## THE BUDA COMPANY

FACTORY, HARVEY, ILL., (Chicago Suburb)

Address all correspondence to our **FACTORY REPRESENTATIVES**  
**BRANDENBURG & COMPANY**

FORD BUILDING, DETROIT

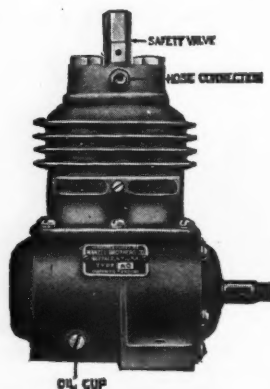


Model "Q"

57TH & BROADWAY, NEW YORK CITY

## Can Be Attached In 10 Seconds

## Does The Work In 10 Minutes



**Cadillac Attachment**

Complete attachments for connecting to 1913 and 1914 Cadillac cars.

Attachment can be made in half an hour by anyone.

That's the beauty of having an engine driven tire pump attached to your motor. You merely connect a hose, throw in a clutch and in a few minutes your tires are up to the necessary pressure.

Contrast this with the way you have been pumping tires. Have you got a very strong recollection of back breaking, straining work which leaves one tired and with blistered hands?—then you need no further argument for demanding the engine pump on your car.

## MANZEL ENGINE DRIVEN TIRE PUMP

**THE ENGINE DOES THE WORK**

Here's a two-cylinder pump that is only one-half as large, weighs less and is more compact than any four-cylinder pump, yet does fully as much work.

THE MANZEL ENGINE DRIVEN TIRE PUMP once attached to a car becomes a permanent feature which supplies only pure, clean air to the tires. THE MANZEL ENGINE DRIVEN TIRE PUMP is scientifically designed, well built and perfect in operation. It gives at least 25% extra service to the tires, because you can keep them at all times correctly inflated.

Soon tire pumping will be as infrequent a sight as hand cranking is now. Get posted on engine tire pumping.

Send—today—for our booklet.

## MANZEL BROTHERS COMPANY

306 BABCOCK STREET

BUFFALO, NEW YORK

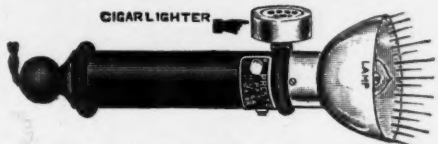


## "PRESTO" Cigar Lighters & Inspection Lamps

### —With Pure Platinum Cigar Lighter Tips



No. 252—Complete Combination of Cord Winder, Cigar Lighter (No. 202), and Holder... \$5.00  
No. 240—Cord Winder alone... \$2.50



No. 200 Combination "Presto" Cigar Lighter and Lamp



No. 215, No. 216 and No. 217, Inspection Lamp

**JOBBER—Get Busy.** Use this set-up for your next catalogue. Electros free for the asking. Beware of imitations, having no platinum wire in their cigar lighter tips!

**Metal Specialties Manufacturing Company**  
736-738 West Monroe St.,  
Chicago, Illinois

Eastern Office—Asch & Co., 1779 Broadway, New York City

**Automatic Cord Winder**  
This device winds up lamp or lighter cord automatically. Can be put in any convenient place in car.

**Combination "Presto" Cigar Lighters and Lamps**  
New design, handle of rosewood finish, nickel-plated cigar lighter tip and reflector. Polished ivory finish push buttons. Furnished with 10 feet of silk cord.  
Mfrs. Description. Price Each.  
No. 200 Complete with regular terminals \$3.50

**"Presto" Cigar Lighters**  
Furnished with 10 feet of silk cord.  
No. 202 Complete with regular terminals and pure platinum tip... \$2.50  
**Extra Platinum Cigar Lighter Tips**  
No. 206 6-volt... \$1.00  
No. 208 8-volt... 1.25  
No. 112 12-volt... 1.50  
No. 214 "Ford Special"... 1.00  
Extra for Edi-Swan Plug Terminals... .25  
No. 220 Holder for cigar lighter, combination cigar lighter or inspection lamp... .25

**"Presto" Inspection Lamps**  
No. 215 One-third reflector, wire guard, 10 feet of cotton cord, regular terminals, adjustable hook hanger—no bulb... .75  
No. 216 Inspection Lamp, same as above, with bulb (Edi-Swan base)... 1.00  
No. 217 Same as No. 216, with bulb and Edi-Swan plug terminals... 1.25



No. 204 "Presto Ford" Cigar Lighter  
No. 205 "Presto Star" Cigar Lighter

**"Presto Ford" Cigar Lighters**  
Designed especially for the Ford Car, get their power direct from the magneto. Equipped with a lighter tip which is especially suited to the Ford Magneto and is marked "Ford Special." Equipped with 10 ft. silk cord.

Nickel-plated holder is furnished with each cigar lighter, which can be attached anywhere in the car. The cigar lighter case is made of polished wood, ebony finish. All metal parts are heavily nickel-plated.  
No. 204. Complete with holder... \$2.50

**"Presto Star" Cigar Lighters**  
Constructed exactly like the Presto Ford, except that they are designed to be used on all other makes of cars and are furnished with 6-volt cigar lighter tips unless otherwise specified.  
No. 205. Complete with holder... \$2.50  
For No. 208 8-volt pure platinum tip, add 25 cents; for No. 212 12-volt, add 50 cents.  
Extra for Edi-Swan Plug Terminals... \$0.25



# DON'T GUESS

Tires inflated to forty pounds look and feel exactly like tires containing eighty. The only way to tell the air pressure in your tires is by means of a

## NEW POSITIVE LOCK-STOP TWITCHELL Air Gauge

Insist upon getting the NEW Twitchell. It possesses a positive lock-stop feature that renders absolutely impossible the registration of any but the exact air pressure in your tires. This construction permits the use of the gauge no matter in what position the tire valve rests. You no longer have to turn the wheel around until the valve is at the bottom. Another improvement to be found in the NEW Twitchell is the lengthened base which permits of an airtight connection being made with the valve no matter how small the space between the rim and hub. The NEW Twitchell is accurate, simple, durable, easily applied and easily read.

**Price One Dollar**

**TWITCHELL GAUGE CO., 1201 Michigan Ave., CHICAGO**



\$12.50

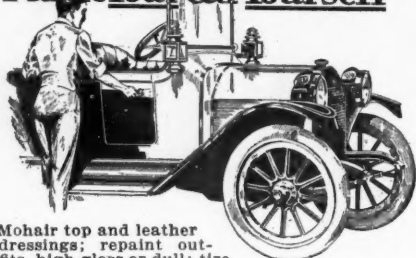


\$12.50

A Pair of Big 10 $\frac{1}{2}$  in. Bullet Electric Head Lights complete with 16 c. p. Mazda bulbs in black enamel and nickel.

We have a complete line of the latest 1914 lamps, electric, gas and oil.

### Paint Your Car Yourself



Mohair top and leather dressings; repaint outfits, high gloss or dull; tire paint; hood and fender outfits; body polish, etc.

System: "My car looks better than many which were painted in St. Louis at six times the cost." (Name on application.) What he has done you can do. No experience required.

Our big free 42 page book, THE CAR BEAUTIFUL, tells how to paint your car yourself, how to care for a new car and tells of the very latest accessories for making the car beautiful.

**Arsenal Varnish Co.,** 2497 4th Avenue, Rock Island, Ill.

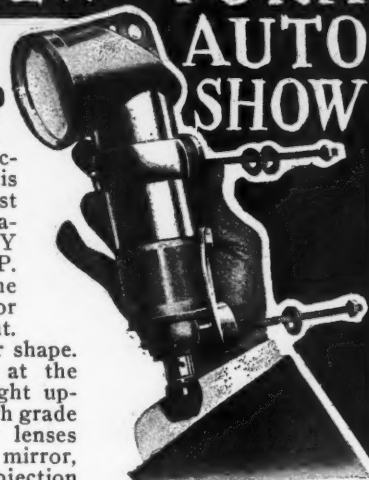
**Save  
\$25 to  
\$75**

**IT'S EASY**

One man in Granite City, Ill., writes, after painting his car with the Arsenal

## THIS WAS THE MOST CONSPICUOUS ACCESSORY at the NEW YORK

### THE ROFFY ACHROMATIC LAMP



Of all the new accessories shown at this year's show—the most attractive and sensational was the ROFFY HEADLIGHT LAMP.

You never saw one built like it before; nor is any lamp so efficient.

It is built in tubular shape. The Tungsten bulb at the bottom throws its light upward through two high grade accurately ground lenses against a French mirror, and then through a projection lens. The light is powerful and pure white. It never rises higher than top of radiator. Doesn't blind because the rays never reach to height of the eye.

Absolutely the latest development in headlamps today. Can be attached to the radiator. Meets strictest city requirements. Made for electric lighted cars only. Price, prepaid, \$35.

DEALERS:—Write us for exclusive agency rights.

**ROFFY-GRACE CORPORATION,** 1926 Broadway, NEW YORK CITY

52-0

Starts — Lights — Ignites

# REMY

Six Volt System—Does-It-All

**A**FTER inspecting the new cars at the coming Automobile Shows, you will insist on Remy equipment, not simply because it will crank engines, light the car or fire the engine, but **BECAUSE:**

This apparatus is designed by O. F. Conklin, the recognized authority on electrical apparatus for motor cars.

This apparatus is built under the factory management of *Men Who Know*.

The responsibility of the complete electrical apparatus is assumed by one reliable, experienced company.

A country-wide system of quick and efficient service is available for Remy users.

We are the only concern building the complete apparatus, either as a whole or in any combination—starting motor—lighting equipment—magneto, or magneto type battery ignition (generator and storage battery). (The starting and lighting equipment is sold only to motor car makers.)

Write for our magneto (any make) exchange offer.

### Remy Electric Company

General Offices and Works, Anderson, Indiana

#### BRANCHES:

New York Detroit Kansas City Minneapolis  
Boston Chicago San Francisco

(Service Stations Throughout the Country)



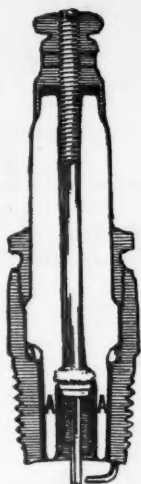
THIS BOX CONTAINS  
100  
"WHITNEY" KEYS  
ASSORTED SIZES  
FOR MOTOR VEHICLES.  
The Whitney Mfg. Co. Hartford, Ct.

**E**VERY garage and repair man should have a box of these assorted keys on hand. They may be purchased from the leading jobbers of automobile supplies or we can supply same promptly from the factory.

**THE WHITNEY MFG. CO.**  
HARTFORD, CONN.



# This double chamber in J-M (MEZGER) SOOT-PROOF PLUG makes short circuits impossible



Sectional View  
Note porcelain  
'petticoat' AA  
extending to  
end of chamber

The J-M (Mezger) Plug is entirely different from any other. It has a double chamber formed by a porcelain "petticoat" around the centre electrode. See illustration.

This "petticoat" extends to the end of the plug and is always so intensely hot at the lower extremity that carbon is burned up the instant it settles. Therefore, the accumulation of soot at the sparking point is positively prevented.

This plug is actually self-cleaning.

Another important feature! Rapid changes of temperature cannot crack the porcelain in this plug. In tests we have heated the plug red hot and then immersed it in cold water without the porcelain breaking.

Millions of these plugs have been sold. In fact, over 400,000 of the best cars in America are now equipped with J-M (Mezger) Soot-Proof Plugs.

They have been on the market over 12 years, and many that have been in use for over 8 years are still in service and as good as new.

## GUARANTEE

The J-M (Mezger) Soot-Proof Plug is backed by a five-million dollar concern with a fifty-five year record for square dealing. If any plug does not give satisfactory service, we will supply a new one or refund purchase price.

Sold by most dealers, or shipped direct from our nearest branch. Price, \$1.

Write nearest branch for interesting illustrated booklet.

See our exhibit at the Chicago Auto Show; Space 1, Main Floor, Gallery Section

## H. W. JOHNS-MANVILLE CO.

MANUFACTURERS OF BRAKE LINING, SPARK PLUGS, VAPORIZERS, AUTO LOCKS, ELECTRIC LAMPS, SPEEDOMETERS, HORNS, FIRE EXTINGUISHERS, DRY BATTERIES, FUSES, TAPES, PACKINGS, ETC.

Albany	Buffalo	Cleveland	Indianapolis	Louisville	New Orleans	Philadelphia	Seattle
Baltimore	Chicago	Dallas	Kansas City	Milwaukee	New York	Pittsburgh	St. Louis
Boston	Cincinnati	Detroit	Los Angeles	Minneapolis	Omaha	San Francisco	Syracuse

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Montreal, Winnipeg, Vancouver

2214

# DOVER AUTO SPECIALTIES FOR 1914



No. 1

No. 1—New Dover Galvanized Garage Funnel. Practical, of large capacity (10 quarts) and popular in price. Strainer of reinforced brass wire cloth; cone shaped, giving larger straining surface and preventing dirt and water from being forced through. Each.....\$1.75

No. 2—New Dover Two-In-One Offset Gasoline Funnel. Heavily copper plated. Capacity 4 quarts; steel band braces spout to body, thus greatly strengthening construction. Spout quickly removable, leaving regular funnel. This combination funnel quickly and easily fills any tank, wherever situated. Price, each.....\$2.00  
Same, with a capacity for 8 quarts, each.....\$2.25

No. 3—New Dover Garage Soap Economizer. Made of heavy galvanized, perforated steel; 6 1/4 inches diameter by 8 inches high. Cuts soap consumption in half, eliminates waste and prevents theft. Used and endorsed by the largest garages. Each.....\$2.50

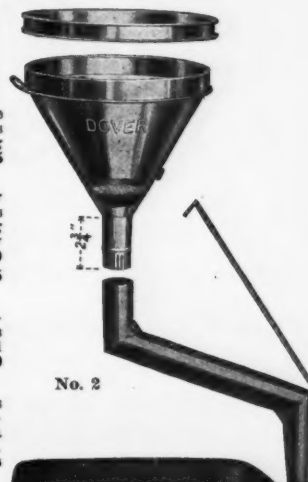
No. 4—New Dover Electric Light Bulb Case. Extra heavy seamless steel; 5 1/2 inches long, 3 1/4 inches wide, 3 1/2 inches deep. Absolute protection against breakage by jar or rough handling. Waterproof. Extra bulbs are safer than those in your lamps, and case occupies little room. Each .....75 cents



No. 3

We manufacture over 235 articles designed especially for automobile use. Send for our 1914 catalog, which describes all of these. Mailed to motorists free on request.

**Dover Stamping & Mfg. Company**  
CAMBRIDGE, MASS.



No. 2



No. 4



## Cox Combination Welding and Decarbonizer Outfit

Save time, money and make extra profit doing your own welding. Outfit complete and simple; repairs worn and broken parts good as new. Welds iron, steel, brass, bronze and aluminum. Safe and sure. Quick repair work. Includes oxygen carbon remover feature. Double work, double profits. Pays for itself in short time. Complete instructions furnished.

Write for Catalog—NOW

### COX BRASS MFG. CO., Albany, N. Y.

1777 Broadway, New York City.  
3445 Michigan Ave., Chicago, Ill.  
870 Woodward Ave., Detroit, Mich.  
1216 Van Ness Ave., San Francisco, Calif.



LANDAULET  
COUPE  
Folding Top  
down

### Closed Bodies for FORD MODEL T

LIGHT DURABLE WELL DESIGNED COMFORTABLE  
IMMEDIATE DELIVERY

Write today for prices and specifications

### Irvin Robbins & Company

10th and Canal,

Indianapolis, Ind.



COUPE



Electric Engine Starters  
Electric Lighting Equipment for Motor Cars

Electric Engine Starters  
Electric Lighting Equipment for Motor Boats

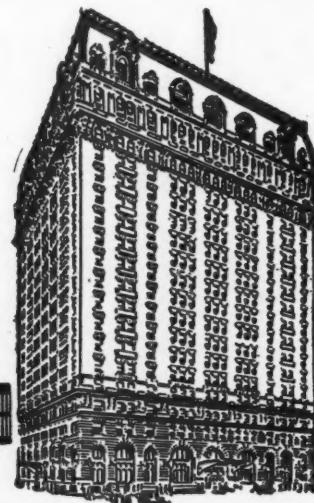
Apelco Storage Batteries

Apelco House Lighting Plants

Apelco Headlights  
Pierce fog and dust as well as darkness

### The Apple Electric Company

America's Leading Manufacturer of  
Electrical Equipment for Motor Cars and Motor Boats  
67 Canal St. DAYTON, OHIO



## Hotel La Salle

CHICAGO'S FINEST HOTEL

ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

### RATES

ONE PERSON	Room with detached bath.....\$2 to \$3 per day
	Room with private bath.....\$3 to \$5 per day
TWO PERSONS	Room with detached bath.....\$3 to \$5 per day
	Room with private bath.....\$5 to \$8 per day
TWO CONNECTING ROOMS WITH BATH	
Two persons	.....\$5 to \$8 per day
Four persons	.....\$8 to \$15 per day
SUITES	.....\$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO



**\$15, \$20, \$25 Per Set of Four—Half These Prices Per Pair**

These Are the 1914 Prices Made Possible  
by the Greatly Increased Production of

# GABRIEL SNUBBERS

Standard factory equipment on Peerless, Stearns, White, Oldsmobile and Lozier. Partial or special equipment on 20 other leading makes.

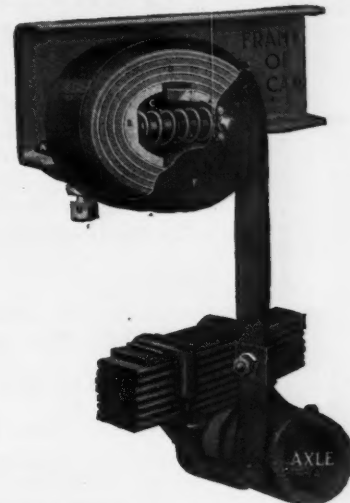
## On Small Cars As Well As Large

Gabriel Snubbers pay for themselves many times over in easy riding, reduced upkeep expense and increased length of service.

Ask the Engineering Department of Your Car About Gabriel Snubbers

**GABRIEL HORN MFG. CO., 1415 E. 40th St., Cleveland, Ohio**

Makers of the Famous Gabriel Musical Horns and Windshield Cleaners



Easy to attach as a pair of lamps. Clamp coil to frame and secure belting around axle. Nothing to work loose, rattle or wear out. No future readjustment required. Snubbers allow the springs to work naturally on the closing movement, but retard abrupt or excessive expansion; prevent the snappy rebound that jars mechanism and passengers; put a stop to excessive up and down movement of springs.

DR. WALTER B. HELM

January 10/14

DR. WALTER B. HELM

Carron and Company, Inc.  
311 West 59th St.  
New York City

Gentlemen:

The size 18 1/2 gloves arrived and are an exact fit.

The gloves have proven entirely satisfactory and do all and more than you claim for them.

Took a trip in the country a few days ago and had a blow-out and my hands got very cold changing the demountable rims where I had to handle the cold

metal, but I got warm ten minutes after I had put the gloves on again.

I most heartily recommend them to any one who drives a car during the winter.

They are one of the most useful accessories and the most indispensable motor equipment I ever had.

Very truly yours  
Allan B. Helm  
740 N. Church St.  
Rockford, Ill.

## YOU CAN'T DISCOUNT FACTS

Read this letter—

(One of many)

You with cold hands

## CARRON ELECTRICALLY WARMED GLOVES

Think this over NOW.  
Remember it when the cutting wind numbs your hands and the frost nips your finger tips.  
Keep in mind when handling cold rims in zero weather after a blow-out that you will have warm hands again as soon as you grip the wheel.  
CAR OWNERS—Write for full particulars and prices.  
DEALERS—Write for our proposition. Descriptive illustrated booklet on application.

**CARRON & COMPANY, Inc.,**

**311 West 59th Street,**

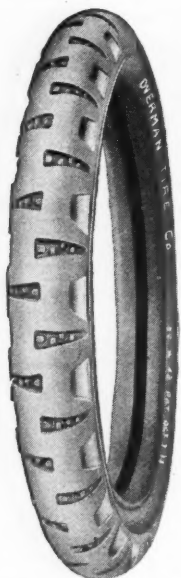
**NEW YORK**



## OVERMAN Pneumatic Cushion Tread Tires

*"The World's Best Tire"*

MOST DURABLE, SAFEST, MOST  
RELIABLE



Patented Oct. 7, 1913

The Overman Pneumatic Cushion Tread Tire is constructed on a new principle, which the severest tests have shown to be scientific in theory and sound in practice.

In offering this tire to the public, our claims for it are based not on what we believe the tire will do, but upon what it actually has done and is doing in daily use on the cars of hundreds of private owners.

5,000 Miles Guaranteed

Specify the  
**OVERMAN TIRE**  
on your new car

**OVERMAN TIRE COMPANY**  
250 West 54th Street New York

### DISTRIBUTORS

Standard Tire & Rubber Co., Boston, Rochester Auto Supply Co., Rochester, Mass.  
F. A. M. Auto Supply Co., Buffalo, N. Y. Jones-Kessler Rubber Tire Co., Washington, D. C.  
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Standard Rubber Tire Co., Philadelphia, Pa.

## Western Electric PITTSFIELD

**SPARK PLUGS**  
are made for  
all cars.



This is our Maximum Duty Plug,  
made in 1/2-inch, 7/8-inch and  
metric threads. The plug for  
connoisseurs.

**PITTSFIELD SPARK COIL CO., Mfrs.**  
**WESTERN ELECTRIC COMPANY**

New York and all principal cities

Space  
Contributed  
By  
Motor Age

Copy  
Contributed  
By  
Elbert  
Hubbard



**A** LOT of time, energy and gray matter has been put into the Lincoln Highway project by good, hard-headed business men. These men are determined, and the project must succeed. They are enthusiastic over the success thus far.

### It Is Now Up to You!

**M**OTORISTS and all lovers and users of good roads should cooperate. The plans need personal work and support. Send your five dollar bill, or more, today and then get busy and sell a book of ten certificates to a few kindred souls like yourself.

### The Lincoln Highway

will make it possible for you and your car to visit the most scenic country in the world. Address

**A. R. PARDINGTON, Vice-President and Secretary,**  
Lincoln Highway Association,  
Detroit, Mich.

## RUDGE-WHITWORTH DETACHABLE WIRE WHEELS

*Fitted With HOUK Quick  
Detachable Rims*

Make for greater resiliency, smoother riding.  
Save tires. Are quickly and easily removed.  
Practically indestructible. Absolutely rust-proof. Now being manufactured in America by the Standard Roller Bearing Company, of Philadelphia.

**GEO. W. HOUK CO.**  
5002 LANCASTER AVE., PHILADELPHIA, PA.

### Have You Read This Week's Classified Columns?

They contain numerous advertisements of interest to you.

It makes no difference what you are looking for—whether a factory superintendent, salesman, foreman or chauffeur—you will find the man listed in **MOTOR AGE** classified columns.





**BIG**  
**REDUCTION IN PRICE**  
on  
**STEWART**  
**GAS SAVERS**

**\$5.00 for Motors up to 40 Horsepower**  
**\$6.00 for Larger Motors**

*Saves up to 40%      20% Guaranteed*  
*Increases Power*  
*Saves Your Brakes*  
*Increases Speed*

**HALLIWELL CO.**  
408 West Pico St.      Los Angeles, Cal.



## McCORMICK POWER PLUGS

Deliver more power and  
minimize fuel consumption

BECAUSE

they completely explode a  
wide range of gas mixture.

Let us prove this by sending  
you a set on approval.

PRICE \$2.00 EACH

McCORMICK MFG. Co.

440  
E. First St. DAYTON, OHIO

## See *The Brown Line*

—AT THE—  
**Chicago Show**

The Brown Impulse Tire  
Pump

The Brown, Jr., Tire Pump for  
Ford Owners

Brown Four Cylinder Pump

Virtue Foot Pump

Brown Gasoline Vulcanizer

Brown Q. D. Spark Plug

Brown Deflecting Head  
Lights

Brown Primer for Ford Cars

*Automobile Necessities*  
of **PROVEN** Efficiency

**The Brown Company**  
120 Bellevue,      Syracuse, N. Y.

## Make Good Your Spark Plug Guarantee

Manufacturers who sell spark plugs under a guarantee  
against porcelain breakage have found it dollars and cents  
in their pockets to specify "EMPIRE."

EMPIRE Porcelains are made by a special toughening  
process to withstand the roughest usage. They are fired  
at a temperature of 2,600° Fahr.—a greater heat than  
any spark plug is called upon to stand in every-day ser-  
vice. The incessant pounding and jarring of vibrating  
cylinders has little effect upon them. Made of best im-  
ported kaolin by porcelain specialists.



Send for Sample      and Catalogue

**Empire**      **China Works**  
142-156 Greene Street      BROOKLYN, N. Y.

When Writing to Advertisers, Please Mention Motor Age.





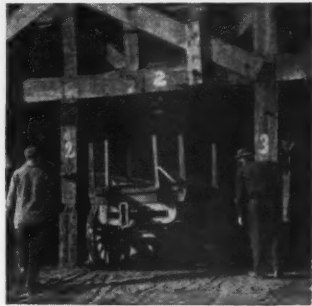
Trailer being backed around right angle corner, guided by man at draw-bar.

Troy Reversible Trailers follow the truck around any corner or into any opening. They can be backed in a straight line or around a corner and spotted any place.

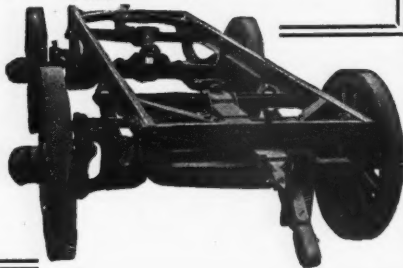
On short or long hauls, you can greatly increase the efficiency of your truck with the Troy Trailer.

Send for Bulletin M and the price

**The Troy Wagon Works Company**  
Clay Street  
TROY MIAMI CO.  
OHIO



This shows trailer in under gravel bin. Note how narrow this space is and how near center truck is placed. There is only about two inches space between truck sides and supports of bin.



## PYRMA ALUMINUM MATTING

FOOT BOARDS  
RUNNING BOARDS  
ALL SHAPES of MOULDING

Use aluminum where the wear is hardest. It's stronger than rubber, makes a better appearance—and costs less. Aluminum doesn't rust or stain from grease and gasoline and never looks unsightly.

### PYRMA ALUMINUM HEEL PLATES

Put these plates back of the foot pedals. They make the flooring look neater and prevent wear.

These plates are made of extra heavy, tough aluminum with  $\frac{1}{4}$  inch pyramids and  $\frac{1}{2}$  inch plain borders. Size 6 x 10 $\frac{1}{2}$  inches.

Screw holes are already drilled. Attach to your flooring in one minute.

Price 75 cents at your dealers'—or direct from us.

Write for samples of aluminum matting and full description of heel plates.

**METALLIC AUTOMOBILE MATTING COMPANY**  
ROCHESTER NEW YORK

## A Reliable Electrical Measuring Instrument Indicates Quality



Weston Model 267 Dashboard Ammeter

## WESTON AMMETERS

for control of Electric Lighting and Self-Starting Systems are the most reliable, durable and highest grade instruments made for this purpose.

Please send for our 30-page bulletin No. 8 describing them

**Weston Electrical Instrument Co.**  
NEWARK, N. J.

New York	Boston	Denver	Birmingham	Montreal
Philadelphia	San Francisco	Cleveland	Toronto	Paris
Chicago	St. Louis	Detroit	London	Berlin

**Skid Blowouts**

**Rimcuts Punctures Wearing Off of Rubber NIT**

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout.

Special Prices to the First in New Territory  
KIMBALL TIRE CASE CO., 173 BOW., COUNCIL BLUFFS, IA.

## EISEMANN



The performance of Eisemann Ignition Systems during the Indiana-Pacific Tour justifies every claim we have ever made for Eisemann efficiency and dependability.

**The Eisemann Magneto Company**

Sales and General Offices  
Bush Terminal, Brooklyn

New York Indianapolis, Ind. Detroit, Mich.  
129 W. 52d St. 514 N. Capitol Ave. 502 Woodward Ave.



CONNECTICUT

## Master Vibrator For Ford Cars

A small, neat, compact master vibrator which draws minimum current from magneto. Has standard "Connecticut" switch so that it fits flush and does not detract from trim appearance of dash.

Install one on your Ford. It gives magneto service—insures easy starting—increased power—smooth-running engine—freedom from frequent adjustment of coils. Price, \$9.00. Delivered on receipt of price.

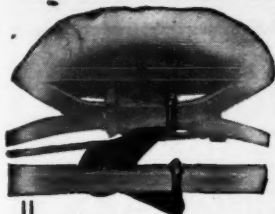
Write for Bulletin No. 36

Connecticut Tel. and Electric Company, Inc.  
Meriden, Conn.



CONNECTICUT

## Shock Absorbers



Built on the only true, shock-absorbing principle. "Takes the bumps out of all roads"—never needs adjustment after being installed properly. Adjusts itself automatically to all road conditions and varying weight of loads.

### Special for Ford Cars

Real shock absorbers possessing all the features of those installed as regular factory equipment on many leading makes of cars. Not a "cheap" device but a superior article, honestly made and guaranteed to give service.

Make your Ford "a parlor car." Equip with "Connecticut." Price, \$22.50 per set.

Write for Bulletin No. 44

Connecticut Shock Absorber Co., Inc., Meriden, Conn.

## BADGER GEAR COMPOUND

"Always on the Teeth"

**S**TAYS where you want it. Clings to the gear teeth at all speeds. Won't pack on the sides of the gear case. Does not run thin. A perfect lubricant from every viewpoint. We also make the well-known F.V. Motor Oil and the Badger Lubricants. All these products have held their own, in actual service, under the most exacting conditions, and are covered by rigid quality guarantee.



**STOP  
THAT NOISE**

**Badger Gear Compound  
Will Make Noisy Rear Axles  
and Transmissions**

**KEEP QUIET**

Ask Your Dealer  
or  
WADHAMS  
OIL CO.

Users  
Write for  
name of  
nearest dealer

Dealers  
Write for  
prices and ter-  
ritory on biggest  
seller you ever had.



## THIS DEVICE INTERESTS EVERY MOTORIST

and is bound to be the fastest selling specialty that dealers have handled in years.

It prevents overheating, scored cylinders and burned bearings, economizes gasoline, indicates lack of oil or water, and greatly reduces repair bills.

## BOYCE MOTOMETER

Over 81 per cent of the world's greatest racing drivers use this specialized thermometer on their cars. This is convincing proof of its widespread demand. It's an accessory that is a necessity. We are advertising steadily in The Saturday Evening Post and motor papers.

Exclusive Sales Agents Wanted. Write at once for proposition.

**THE MOTOMETER COMPANY, Inc.**  
1790 BROADWAY NEW YORK CITY

## Demand the Genuine



There can be but one "Ideal Package"—the original outfit—manufactured by HANLINE BROS. Demand the genuine and you'll have no regrets.

The package contains fifteen articles—sufficient material to repaint and refinish a Ford car or any other auto of the same size.

### Retails for \$6.50 Complete

Saves 75% of the usual painting cost. Experience is unnecessary—car can be used the next day.

For sale wherever Ford cars or accessories are sold—distributors in leading cities.

**HANLINE BROS., Baltimore, Md.**  
Paint Manufacturers



## SOLAR LAMPS

A discriminating public has voted in favor of Solars—the quality motor lamps.

Backed by 15 years of specialization. Found on more high-grade cars than all other makes of lamps.

A Solar Lamp for every motor need.

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**THE BADGER BRASS MFG. CO.**  
KENOSHA, WIS. NEW YORK CITY

## The Benham Steering Gear for CYCLECARS

Adapted to Overslung or Underslung Cyclecars

Adapted to  
Either Right  
or Left Steer,  
also Center.

Send your specifications and requirements for quotations. We can make immediate deliveries.

**Benham Mfg. Co.**  
1882 Mt. Elliott Ave.  
DETROIT, MICH.

## STAPLEY TIRE PUMP

Made by Bridgeport Brass Co.

**Increases the Life of Tires**

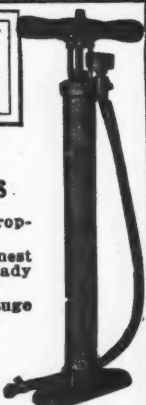
The STAPLEY makes it easy to keep tires properly inflated.

It is an efficient Compound pump of the finest materials and workmanship; it is always ready and always works.

Price without Gauge \$4.00

With Gauge \$6.00

**THE BRIDGEPORT BRASS COMPANY**  
P. O. Station A Bridgeport, Conn.



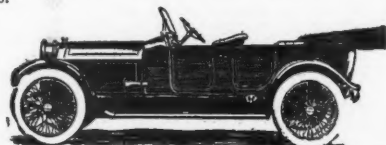
## HENDERSON

### KEROSENE BURNING CARS

Twenty miles per gallon on kerosene or gasoline, as proven by cross-continent trip, a trip around the world and by cars in the hands of hundreds of satisfied owners—four and six-cylinder models.

Write for  
"Kerosene Facts"

**Henderson Motor  
Car Company**  
Indianapolis



## HAYWOOD STEAM VULCANIZERS

THE PROFIT MAKING PLANTS



The vulcanizing system that DOES NOT use air bags. SOLID PADS and HEAVY CLAMPS are the means through which pressure is generated.

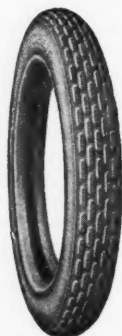
Plants from  
\$25 to \$500

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**HAYWOOD TIRE & EQUIPMENT COMPANY**  
524 N. Capitol, Indianapolis, Indiana

## REPUBLIC STAGGARD TREAD TIRES

Republic Staggard Tread, Pat. Sept. 15-22, 1908



Among your friends are men—exceptionally keen, shrewd, far-sighted fellows—whose business judgment you respect.

These men are pretty sure to have the Republic Tire on their cars. Ask them what they think of it.

If you do this, your next tires will be Republics.

**THE REPUBLIC RUBBER COMPANY**  
Youngstown, Ohio

Branches and Agencies in the Principal Cities

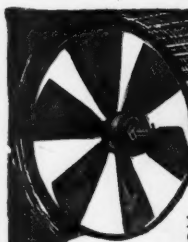
## WINTON SIX

Not an Experiment

The Winton Six satisfies—to the very limit of an owner's requirements. And no wonder, for it is the one high-grade car the world over that, in a single model, has been undergoing a straightforward development through seven consecutive years. Designed right in the first place. Radical changes never necessary. Fully equipped with the best of everything, \$3250. Ask for catalog.

**THE WINTON MOTOR CAR CO.**  
424 Berea Road, Cleveland, O.

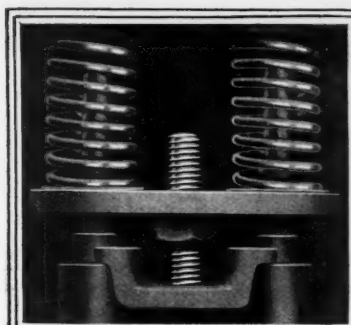
World's First Maker of Sixes Exclusively



**Manufacturers of 1914 Models**  
Don't omit a SPARKS-WITHINGTON Fan from your 1914 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

**The Sparks-Withington Co.**  
JACKSON MICHIGAN - WALKERVILLE CAN.





The Perfect Valve Spring Lifter.  
Patent Apld. for.  
The simplest and quickest method of  
removing Ford valves.

Manufactured by WINTON L. SMITH  
78 Clinton St., Newark, N. J.

## FORD

### OWNERS

Improve the running of your motor and greatly increase the power by grinding the valves and cleaning out the carbon. Do this yourself. The Perfect Valve Grinding Set

includes the Perfect Valve Spring Lifter, Tool for turning the valves, Wrench Socket to fit cylinder head bolts. Thickness Gauge for adjusting push rods. Valve grinding Paste and full instructions for doing the work.

Price \$2.00 Postpaid

Send Check, Money Order or money by registered mail. Money refunded if not satisfactory.

Write for circular.

## CAMERON CARS

### Mechanically Excellent

A remarkable lot of car value is contained in the 1914 CAMERON. Patented Four-Speed Transmission, Water Cooled, Electric Lighting and Starting. Price, \$1200.

See it. Examine it. Ride in it. You'll be convinced.

Get our literature—NOW.

CAMERON MFG. COMPANY

NEW HAVEN,

CONN.

## The Searchlight Gas Co.

1016 Karpen Building

CHICAGO, ILLINOIS

Stronger than ever, legally, financially and in the esteem of the trade. Watch us grow.

### BRANCHES AND REFILLING STATIONS:

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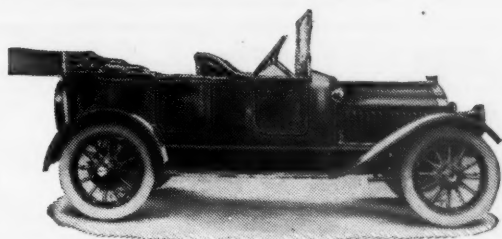
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Motor Cars

Send for Pleasure or Commercial Catalogue

KNOX AUTO CO., SPRINGFIELD, MASS.



## Marathon Automobiles

America's most comprehensive line. Every car completely equipped. 3 sizes chassis—10 body styles.  
Price range from \$925 to \$1495

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HERFF-BROOKS CORPORATION, Indianapolis, Ind.

## SCHAFER BALL BEARINGS

MADE IN GERMANY

SOLD IN AMERICA



When you buy SCHAFER BALL BEARINGS you are not experimenting because SCHAFER BALL BEARINGS have for years been recognized as the standard of bearing quality. They are made in Germany of the best steel and are now in universal use throughout the world

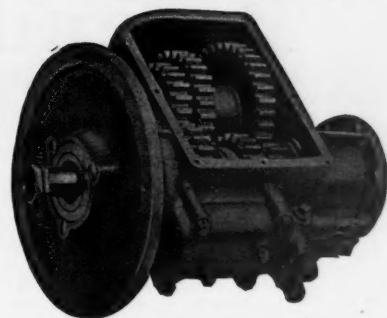
BARTHEL & DALY

42 BROADWAY

NEW YORK

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AUTOMOBILE PARTS



THE WARNER MANUFACTURING CO.  
TOLEDO, OHIO

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## WARD-LEONARD SYSTEM



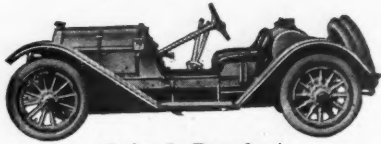
Lighting - Starting

Faultless Lighting  
Infallible Starting

WARD-LEONARD ELECTRIC CO.  
BRONXVILLE, N. Y.



# MERCER



Series J—Raceabout

The remarkable endurance of Mercer raceabouts is not accidental. It is the result of conscientious attention to even the slightest detail of manufacture.

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MERCER AUTOMOBILE CO. 800 Whitehead Road  
TRENTON, N. J.

It Is a Great Deal Better to Use



because your car is NEW,  
than to have to do so be-  
cause your car is prematurely  
OLD.

N. Y. & N. J. Lubricant Co., 165 Bdw'y., N. Y.  
Chicago, 1430 Michigan Ave. Philadelphia, Race & Broad

## The Pilot "THE CAR AHEAD"

Three Great Models—Pilot 50—4 cylinder, 4½x6—50 H. P. touring car—\$2250. Pilot 50—roadster—4, 6 and 7 passenger bodies, 126 inch wheelbase—\$2500. Pilot 60—6 cylinder, 4x6, brake test 67 H.P., 132 inch wheelbase, roadster, 4, 6 and 7 passenger touring cars—\$2785.

### THE CAR WITHOUT A MECHANICAL DEFECT

Teetor "T" Head Motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Elsemann Magneto, Carter Carburetor, handsome jewel bodies with ventilating windshield. Completely equipped with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States. Write for our beautiful art book showing cars in detail.

PILOT CAR SALES COMPANY

Richmond, Indiana

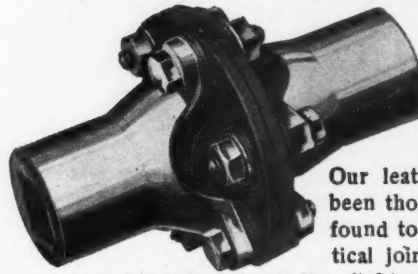
# KINGSTON IGNITION DEVICES

High and low tension magnetos, make-and-break coils, dash coils, box coils, motorcycle coils, switches, spark plugs and other ignition specialties. Guaranteed satisfaction.

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KOKOMO ELECTRIC COMPANY, Kokomo, Ind.

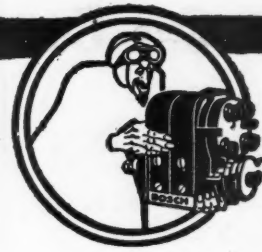
## Blood Bros. Universal Joints Style L for Cyclecar



Our leather disc type has been thoroughly tested and found to be the most practical joint for the cyclecar on account of its simplicity, lightness and low cost.

OUR CORNELIAN CYCLECAR WILL BE  
READY FOR DELIVERY IN MARCH

BLOOD BROS. MACHINE COMPANY, Manufacturers  
Kalamazoo, Michigan



## The Bosch Magneto

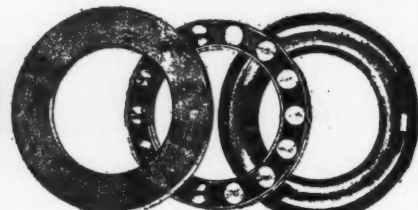
is universally recognized among those who know  
as the one perfectly reliable ignition source

Bosch Equip Motorists never discuss ignition trouble  
Why should you?

Bosch Magneto Co., 214 West 46th St., N. Y.



RADIAL RETAINERS



COMPLETE THRUST BEARING

The Star Ball Retainer Co.  
Lancaster, Pa., U. S. A.

Manufacturers of Radial Ball Retainers, Thrust  
Ball Retainers, Complete Thrust Bearings



Bull Dog  
Non-Skid

## Braender Tires & Tubes

Are of the highest quality  
and the cheapest on mile-  
age.

They are built to last.  
Ask any user.

ESTABLISHED AGENTS SOLICITED

We will exhibit at the Chicago Show, Space 10-A,  
Coliseum basement.

Send for Price List and full particulars

BRAENDER RUBBER & TIRE CO.

Main Office & Factory RUTHERFORD, N. J.  
Salesrooms: 1987 Broadway, N. Y.  
J. R. Johnson, Agent, Greenwich, Conn.

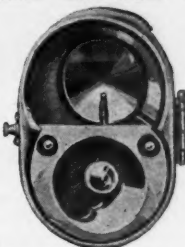


**P-G-N Combination Gas and Electric Headlights**

TWO SOURCES of light the only positive security against occasional light failure.

**YOU ARE AN** exception if never caught lightless of a stormy night on a wretched piece of road.

With P-G-N Headlights one need never be so caught.



Highly efficient  
Touring Lights

Glare-Proof  
City Lights

Pass anywhere  
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No stopping for  
light adjustment

An extra Source of Light is as necessary as an extra tire

**J. R. PAGIN LAMP COMPANY**

Tel. Calumet 5532

1325 S. Mich. Ave., Chicago

**Perfect Carbon Remover \$10**

Will remove all carbon from cylinders. Easily and in few minutes. Equal of any high-priced outfit. All parts guaranteed. Keeps up efficiency of cars and trucks. **Big money maker for garages.**

**Price \$10**

(without oxygen tank)

Usual price \$15. As we sell for cash only and no accounts carried, customers are given \$5.00 off on every outfit. Express companies allow inspection—you take no chances.

Sent prepaid—cash with order or C. O. D.

**OXYGEN DECARBONIZER COMPANY**

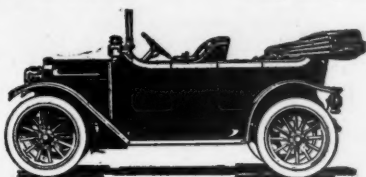
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Troy, N. Y.

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*The* **Detroit**— \$850 and \$900  
Completely Equipped

Five  
Passenger  
Touring  
Car



28 H. P.  
Long  
Stroke  
Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car

**BRIGGS-DETROITER COMPANY, 455 HOLBROOK AVE., DETROIT, MICH.**

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**The Supreme Pullman**

Model 6-46

A MODERN  
CLASSIC Price, \$2,250

For the first time the rules of art have been applied successfully to automobile coach and chassis building. In its Model 6-46 this company firmly believes that the acme of human endeavor as applied to automobile construction has been attained.

Fours and Sixes—\$1775 to \$2850

WRITE OR WIRE

**PULLMAN MOTOR CAR COMPANY, York, Pa.**

**SHALER Vulcanizers**

Keep Tires in  
Good Condition

Send For Free Book

"Care and Repair of Tires"

that tells what to do for every kind of tire trouble. Every motorist should read it.

**C. A. SHALER COMPANY**

203 Fourth St. Waupun, Wis., U. S. A.

**American Axles**

Found only  
on high  
grade cars

**THE AMERICAN BALL-BEARING CO.**  
Cleveland, Ohio

**KINGSTON CARBURETOR****Save Money by Economizing Gasoline**

Four floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment

Made by the oldest manufacturers of carburetors in America  
ESTABLISHED 1895

**BYRNE, KINGSTON & COMPANY, Kokomo, Ind.**



Model T Runabout.....\$500

Model T Touring Car..... 550

Model T Town Car..... 750

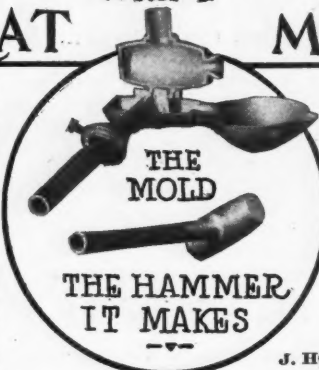
With Full Equipment f. o. b. Detroit

**FORD MOTOR COMPANY**  
Detroit, Michigan



## Make Your Own Soft Hammer with a HORAT MOLD

No more ruining screws, pins, bearings, or some finished part with a hard steel or copper hammer! You make a HORAT soft metal hammer of 180 worth of lead and babbit. You make it yourself. Will not batter a finished part. Never becomes hard like a copper hammer. Pays for itself.



Anyone can use this mold. Made in 4 sizes, for Nos. 2, 3, 4 & 5 hammers. Prices for mold and ladle, including 1 hammer handle: No. 2, 2-lb., \$1.20; No. 3, 3-lb., \$1.30; No. 4, 4-lb., \$1.40; No. 5, 5-lb., \$1.50. At all dealers or direct on receipt of price. Address Dept. F. J. HORAT, Manufacturer Lafayette, Ind.

## Bricton Pneumatic Tires

At last the pneumatic tire problem has been virtually solved—the weak points in previous tire construction have been eliminated. The resiliency of a Bricton Pneumatic Tire puts it in a class by itself. It is Puncture-proof—Blowout-proof—Skid-proof—Rat-proof—Rim-cut-proof—Oil-proof and Gasoline-proof.

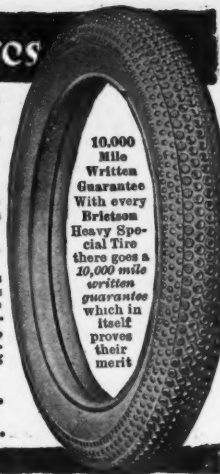
### Ten Days' Free Trial

To remove all doubt that might arise in the purchaser's mind and to back up our statements—we will allow 10 days' free trial on the first set that goes into each town.

### Your Tires Can Be Made Like This

If you are not in need of new tires and the fabric in your present tires is still good—we can rebuild them the Bricton Way—making them Puncture-Proof, Non-Skidding, Blowout-Proof, Rat-Proof, Oil-Proof and Rim-Cut-Proof. Write today for full particulars, giving your dealer's name.

THE BRICTON MFG. CO.  
1214 Bricton Bldg.,  
Brookings, So. Dak., U. S. A.



## Use Polo Pneumatic Tire Alarms

Rim Cutting Entirely Done Away With—Lessens Blow-Outs and Blisters

Easily and quickly attached to valve stem, they take the place of the cap. Compactly made and reduced to the smallest possible size compatible with strength and durability. Running on low air pressure shortens the life of a tire more than any other cause. The Polo Pneumatic Alarm advises you instantly when the pressure falls below a given point, by giving vent to a shrill whistle.

Sold in sets of four, at \$6.00 per set. We invite inquiries from dealers and auto users. Write for descriptive folder.

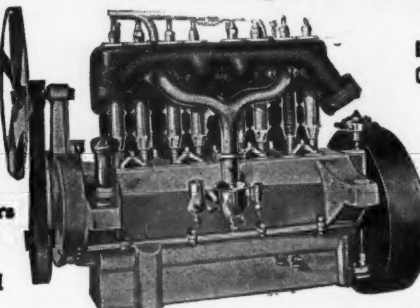
Polo Pneumatic Alarm Mfg. Company  
CLEAR LAKE, S. D.



## Brennan Standard High Grade Motors

Large Bearings  
Long Stroke  
4 and 6 Cylinder

Our leaders  
MODEL B  
4 1/2 x 5  
MODEL M  
4 x 5



High Grade 4 Cycle Motors

for  
Elmore Cars,  
Warren, Corbin, White  
Steam Cars  
and standard makes of cars and trucks, also transmission gears.

4 Cyl., 5x5, 40 H. P., 4 Cyl., 4 1/2 x 5, 35 H. P.

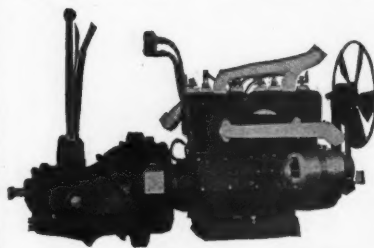
BRENNAN MOTOR MFG. CO., Syracuse, N. Y.

## A Shot in the Dark Seldom Hits Anyone But the Wrong Fellow

The same axiom applies to advertising. An advertisement in "just any paper" may catch the attention of desired parties—but it is another case of shooting in the dark and hoping to hit the mark. If you really want the attention of motor car owners, dealers or manufacturers—if you want to shoot in broad daylight, with short range and a hair trigger, use

MOTOR AGE  
CLASSIFIED COLUMNS  
The Trading Center of the Motor Car Industry

## Motors G-B & S Motors



We beg to announce our latest four cylinder Unit Power Plant.

This Motor includes the recognized engineering practice, here and abroad. "Craftsmanship of long experience is the result of this distinctive Power Plant."

Detailed information on request, and we are in a position to make prompt deliveries according to contract.

GOLDEN, BELKNAP & SWARTZ CO.  
DETROIT, MICH.

# Polarine

FRICITION REDUCING MOTOR OIL

Maintains the correct lubricating body at any motor speed or heat

STANDARD OIL COMPANY  
(AN INDIANA CORPORATION)



WHITMORE'S AUTO GEAR PROTECTIVE COMPOSITION  
For Transmission Cases  
WHITMORE'S AUTO GEAR PROTECTIVE COMPOSITION  
For Differential Cases  
WHITMORE'S WORM GEAR PROTECTIVE COMPOSITION  
WHITMORE'S ANTI-FRICTION COMPOSITION  
For Grease Cups, Universal Joints, Etc.  
WHITMORE'S CHAIN COMPOSITION  
WHITMORE'S SILENT CHAIN COMPOSITION  
WHITMORE'S SPRING COMPOSITION

Accurate Gear Caliper measurements will show less wear at the end of one, two or three years, where

### Whitmore's Auto Gear Protective Compositions

are used than at the end of one, two or three months where other lubricating materials are used.

In ordering Whitmore's Compositions, state definitely for what part of car lubricant is wanted.

THE WHITMORE MFG. CO.  
Lubricating Engineers  
33 Iron Court, Cleveland, Ohio, U. S. A.





# THE ONE-MAN TOP

IT NEEDS NO CRY FOR HELP



Complete Tops, Frames, Sockets and Shop Rights

Protected by 11 Patents and other Patents pending

CAN BE HANDLED BY ONE PERSON AS EASILY & QUICKLY AS AN UMBRELLA

INSTANTANEOUS PROTECTION

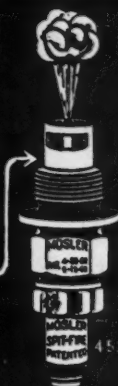
GOLDE-PATENT MANUFACTURING CO. 513 W. 56th ST. NEW YORK.

## Mosler Spit Fire Plugs are the BEST

FOR 13 YEARS HAVE BEEN LIKE THIS

INSIST ON OUR GENUINE PLATINUM POINTED PLUGS

A. R. MOSLER & CO.  
P. O. BOX "M," MT. VERNON, N.Y.



## Dayton Airless Tires

—reduce tire expense



You'll have no more punctures; no more blow-outs when you use Dayton Airless Tires. It's their construction that does it; they contain no compressed air.

Fit all clincher rims; have a very liberal mileage guarantee. Ask us for full details.

**DAYTON RUBBER MFG. CO.**  
1005 Kiser Street Dayton, Ohio

## THE BENTON THE CASE HARDENED PLUG



For SERVICE and RELIABILITY  
LE BENTON CO.  
VERGENNES VT.

## UNIVERSAL VULCANIZER

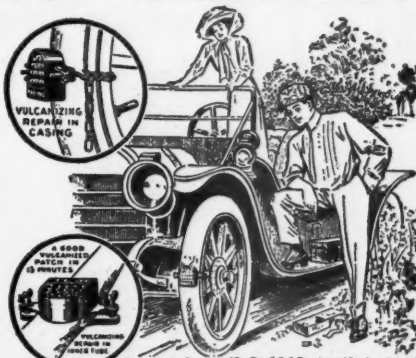
**Tire Cuts Ruin Casings**  
They admit moisture to the carcass, cause the fabric to rot and weaken, grow larger—end in blowouts. You can repair casings and inner tubes anywhere in 15 minutes, good as a repair shop can do—and for one cent.

A Practical Vulcanizing Outfit Complete, with enough repair gum to make 30 patches. Weighs 3 pounds, can be carried in tool box.

Price complete, \$3.50

Ready for Instant Use. At your dealers, or we will send it prepaid. Guaranteed satisfactory or money refunded.

**ADAMSON MFG. CO.,**



Patented April 2, 1912, April 1, 1913  
East Palestine, Ohio

## SIMPLEX AUTO LIFTED TOP LIFTER

Raises or lowers top in one minute—"Record operation, 30 seconds." Lifter handles one side, you the other. Top can't slip—Bow can't break. Simple—Strong—Necessary.

Dealers—They will sell as fast as you can demonstrate. Write.

**SIMPLEX SPECIALTIES CO.**

69 BUHL BLOCK, DETROIT, MICH.

# Corcoran Lamps

GAS, OIL, AND ELECTRIC

CORCORAN LAMP CO.  
CINCINNATI, OHIO

# SHARRER ONE HAND TOP



FULLY PROTECTED BY PATENTS

It is the only top that can be raised or lowered with one hand in less than ten seconds. Shop rights to manufacturers. Also complete tops, frames, sockets.

Light—Simple—Rigid

**SHARRER PATENT TOP COMPANY, Inc.**  
245 West 55th St. NEW YORK



## deSoto Cycle Cars

### \$385

Contract  
Now  
to Be Sure  
of Spring  
Deliveries

The fastest, neatest two passenger tandem car to be had.  
Speed, 40 miles per hour.  
35 to 50 miles per gallon of gasoline.  
Write today for particulars and specify exact territory wanted.

de Soto Motor Car Company, Auburn, Ind.

**WANTED: Good representatives.** The agency for JESCO electric starting-lighting equipment is a big asset to an electrical or accessory concern. With the JESCO you can secure a good business in making installations on cars in use. Some territory is still open. Let us outline our installation and service agency proposition.



Write for full particulars.

**Jones Electric  
Starter Company**

Jackson Blvd. and Loomis St., Chicago, Ill.

**THE SILENT CAR**  
**BUILT TO LAST**  
Attention, Agents!!  
We are offering a big, liberal proposition and unusual sales help to Agents on the

**1914 Dorris Truck & Pleasure Car**  
We sell "through" the dealer and not "to" him. Write today.  
**DORRIS MOTOR CAR COMPANY** St. Louis, Mo.

## Buy Better Springs



Guaranteed against breakage and sagging at less price than of car factories. Freight allowed on four or more. In stock, painted for Ford, Buick, Cadillac, Chalmers, Hudson, Maxwell, Regal, Reo, and others.

Send for complete list and price

**NEW ERA SPRING & SPECIALTY COMPANY**  
247 Jefferson Ave., Detroit.

## HESS AXLES

HESS Axles have been on the market but 2 years. Fourteen car manufacturers in that short time exclusively adopted them as regular equipment.

Renewals of HESS contracts for 1913 from past users and an increasing HESS demand among new manufacturers, is ample proof of the stability of HESS Quality.

May we be of service to you? Write us.

**THE HESS SPRING & AXLE COMPANY**  
Carthage, Ohio, U. S. A.

## METZ "Twenty-Two" Roadster

THE GEARLESS CAR

"No clutch to slip—no gears to strip."



### \$475

1914  
Improvements

Completely Equipped

Center control, left-hand drive, 4-cylinder 22½ H. P. water cooled motor, Bosch magneto, standard artillery wheels, best quality clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 60 miles per hour on the high speed, 25 to 32 miles on 1 gallon of gasoline, and is a wonderful hill climber. A strong, reliable, stylish, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory. Write at once for Book "K" and particulars.

**METZ COMPANY**

**WALTHAM, MASS., U. S. A.**

Six Cylinder, 65 H. P.  
Equipped with Vulcan  
Electric Gear Shift

Four Cylinder, 40 H. P.  
Equipped with Vulcan  
Electric Gear Shift

# HAYNES

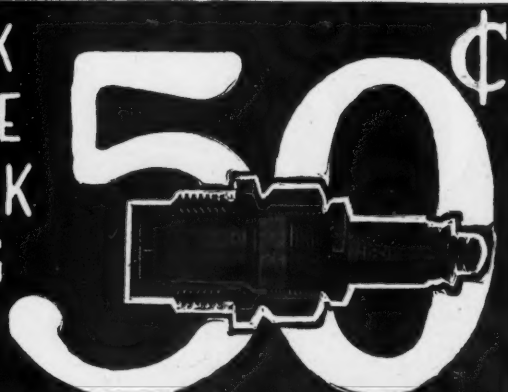
*America's First Car*

Our advertising campaign will send a buyer into your showroom more than half convinced that he should own a Haynes; the sale, however, results only from a successful demonstration; it is our firm belief that as a Haynes dealer you possess more than a sufficient number of convincing arguments to make every demonstration result in a quick and profitable sale.

May we tell you why we believe this?

**THE HAYNES AUTOMOBILE CO., 2 Main St., Kokomo, Ind.**

## BLACK EAGLE SPARK PLUG



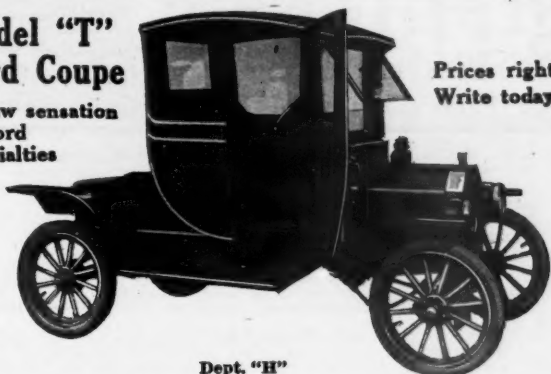
*The* **STANDARD COMPANY**

Torrington, Conn



## Model "T" Ford Coupe

A new sensation  
in Ford  
Specialties



Prices right  
Write today

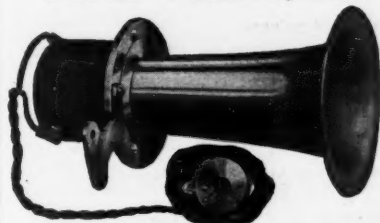
Dept. "H"

AUTO SPECIALTY MFG. CO. 326-330 E. Market St.  
INDIANAPOLIS, IND.

## Motor Driven Horn

No. 23—Samson, Jr.

**\$10.00**



Loud Simple  
Strong Reliable  
Guaranteed

Big Factory and  
Financial Responsi-  
bility back of every  
Samson Horn.

Live Dealers Get Our Money Making Offer

American Electric Co., Mfr., State and 64th Sts.  
CHICAGO, U. S. A.

## HERZ PLUG

"BOUGIE MERCEDES"



BLUE STONE & STEEL  
Guaranteed One Year  
Your Dealer or HERZ & CO. New York

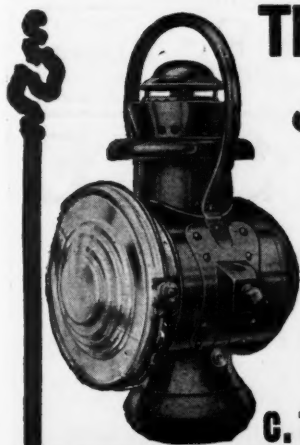
## KRUPP STEEL

IS NO EXPERIMENT. It is the best that brains and years of experience can produce. Manufactured in various grades for all motor car parts. Round forged bars of chrome nickel steel, grade E F 60.0, carried in stock in New York City.

THOMAS PROSSER & SON  
28 Platt Street, New York City

## The Oil Pot's Inside

HAM'S  
STEEL MOTOR TRUCK  
LAMPS



Send for  
Catalogue  
Price List  
Discounts

C. T. Ham Mfg. Co., ROCHESTER,  
N. Y., U. S. A.

## \$60.00 A Year Saved In Tires

That's only one of the savings now offered motorists by the already well known



TAYLOR  
"NOIL"  
TIRE PUMP

An engine driven tire pump that adds to life of tires by keeping rubber-rotting oil and oily vapor out of the tube. No oil to get in. Also saves an endless amount of back-breaking pumping by HAND! Engine does it all. That's the other advantage. The only pump made with diaphragm and plunger. The one pump that CAN be easily applied! Special bracket for your own car furnished together with hose, tire gauge, etc.

Write Today for Circular

In writing, please give make, model and year of your car.  
TAYLOR MFG. CO., P. O. Box 485 A-L, Chicago, Ill.

Standardized Transmissions



Covert Motor  
Vehicle Co.

Sales Office Detroit  
Factory Lockport N.Y.

## Hyatt Roller Bearings



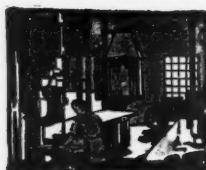
Lead the world in quantity of production. Twelve mammoth factory buildings required to supply the demand.

### SERVICE STATIONS

756 Woodward Ave....Detroit, Mich.  
1120 Michigan Ave.....Chicago, Ill.  
4th & Middlesex Aves..Harrison, N. J.

HYATT ROLLER BEARING CO.  
Detroit, Michigan





# The Clearing House

of the Motor Car Industry

For Second-hand Shop Equipment • Used Cars • Parts and Accessories



1" one time, \$4.50; 2" one time, \$8.75; 3" one time, \$13; 4" one time, \$16.75. Write for rates of larger spaces and longer terms.

## PRICE WRECKERS

It conveys to the public a correct name to our operations. Our business is founded on sound principles, combined with such low prices that no competitors or business organizations can stop our growth. In the automobile industry, we hold the foremost position. We established this business in 1904, and have steadily grown until for the past five years we have been recognized by the Trade as THE WORLD'S LARGEST DEALERS in NEW AND USED MOTOR CARS AND ACCESSORIES.

We buy and sell for cash only. We have no losses, and the man who sells has no losses. We take advantage of the manufacturer, both when he is in need of funds to continue his business, and when he sacrifices to pay his creditors, or when he has overbought and must dispose of the same in large quantities, having no other outlet for doing so. All of these facts, combined with our policy of LARGE VALUES, and small profits enables us to place before you our merchandise at prices heretofore unheard of in the automobile line.

Below we mention a few of the numerous values which we are offering—but only a postal card will bring to you our great PRICE WRECKER, which saves money.

### NEW AUTOMOBILES

Reg. Price	Our Price
\$1750..New, 7 passenger, 40 h.p. Regal Touring Cars.....	\$ 335
\$1250..New, 5 passenger, 30 h.p. Regal Touring Cars.....	\$ 685
\$1585..New, 5 passenger, 40 h.p. "Mighty Michigan" Cars.....	\$1090
\$1400..New, 5 passenger, 33 h.p. "Mighty Michigan" Cars.....	\$ 990
\$1250..New, (Stoddard-Dayton) Courier, 30 h.p. Roadster.....	\$ 690
\$1390..New, Celebrated King Roadsters, 36 h.p.....	\$ 875
\$2750..New, Guy Vaughan Chassis (raceabout type) 30 h.p.....	\$1250

We have a number of other makes of new, guaranteed automobiles, names of which we are restrained from advertising publicly, through a special agreement with the manufacturers. We will be glad, however, to send complete list upon request.

### NEW MOTOR TRUCKS

Reg. Price	Our Price
\$2000..Sampson 1½ ton Truck Chassis.....	\$1300
\$3400..Sampson 3 ton Truck Chassis.....	\$1950
\$4250..Sampson 4 ton Truck Chassis.....	\$2250
\$4750..Sampson 5 ton Truck Chassis.....	\$2600
\$1850..Hercules 1 ton Truck, equipped with Express or Stake body, complete.....	\$1250

### Body Department

WIND SHIELDS: All Styles, \$5.00 upward.

AUTO TRUNKS: At \$2.50 upward.

MAGNETOS: All makes including Bosch, Splitdorf, Kurtz, Remy, Pittsfield and J. & B.

Our Special Bargain, \$85.00. Upholstered in the best quality of real leather. We can supply new touring bodies, upholstered in the very best quality of leather, from \$40 to \$125, according to the size and style. We also have a large number of Coupe, Sedan, Limousine and Landaulet bodies, and all kinds of commercial bodies.

SPARK PLUGS: Every make at cut prices.

TIRES: We can save you more real money on tires, quality considered, than any other concern in the country.

### MOTORS

We make a specialty on MOTORS for both automobile and marine purposes. OUR SPECIAL BARGAIN—Lyons-Atlas 38 h.p. Motor, made for use in the Stoddard-Dayton 38 h.p. Cars, absolutely new, 4¼" bore x 5½" stroke. Regular Price, \$510.00. OUR SPECIAL PRICE (while they last), \$165.00. Don't miss this wonderful opportunity. This is less than what it would cost to overhaul your old motor.

	Reg. Price	Our Price
6 cylinder, 4 cycle Herschell-Spillman Motor, 50 h.p., 4" bore x 5" stroke.....	\$600.00	\$275.00
4 cylinder, 4 cycle Herschell-Spillman Motor, 40 h.p., 5½" bore x 5¼" stroke.....	\$550.00	\$275.00
4 cylinder, 4 cycle Buda Motor, 35 h.p., 4 5-16" x 5" stroke.....	\$700.00	\$200.00
4 cylinder, 4 cycle Poss Motor, 25 h.p., 3¼" bore x 4¼" stroke.....	\$400.00	\$140.00
2 cylinder, 2 cycle Reliance Motor, 15-18 h.p., 5½" bore x 5" stroke.....	\$400.00	\$ 95.00
4 cylinder, 4 cycle Lyons-Atlas, 5½" stroke, 4¼" bore.....	\$510.00	\$165.00
6 cylinder, 4 cycle Brownell Unit Power Plant, complete with Transmission, 3¼" bore x 4" stroke.....	\$600.00	\$225.00

World's  
Largest  
Dealers

**TIMES SQUARE AUTO CO.**  
S. W. Cor. 56th St. and Broadway, New York 1210 Michigan Ave., Chicago

World's  
Largest  
Dealers

## YEARLY CLEARANCE SALE

Rare Opportunity—Rock Bottom Prices—State Briefly Your Wants—Quick Action Is Our Motto—These Goods On Hand for a Limited Time Only

- 150 Coupé bodies, three and five pass., 1914, \$150.00 to \$275.00.
- 75 Limousine bodies, 4, 5 and 7 pass., \$100.00 to \$450.00.
- 150 Palmer Singer, 4, 5 and 7 pass. touring bodies, new, \$45.00 and \$75.00.
- 100 Runabout and racer bodies, \$35.00 to \$75.00.
- 100 Bergdoll four pass. bodies, \$85.00.
- 100 D.R. 4 Bosch magnetos, at \$31.50.
- 50 D. 4 Bosch magnetos, at \$35.50.
- 50 D.R. 6 Bosch magnetos, \$42.50.
- 50 D. 6 Bosch magnetos, \$45.50.
- 400 Prest-O-Lite tanks, \$7.50 to \$10.25.
- 400 Windshields, \$6.25-\$12.00.
- 500 Headlights, \$5.00 to \$10.00 pair.

- 1000 Side lamps, \$2.75 to \$5.00 per pair.
- 100 Stromberg carburetors, all sizes.
- 200 Shebler carburetors, all sizes.
- 100 Pressure gasoline pumps.
- 200 Gasoline tanks, all types.
- 20,000 Bearings R.I.V., H.B., D.W.F., New Departure and Timken at very low prices.
- 500 Touring tops from \$10.00 to \$25.00.
- 1000 Dash boards, all sizes, \$2.25.
- 500 Steering wheels, 18 inch, \$3.25.
- 1000 Tool boxes, \$1.00 to \$2.50.
- 200 Double screw jacks, 75c, in lots of 6.
- 100 Rear axles for Stoddard-Dayton, Peerless, Stearns, Packard, Amplex, Alco, Pierce, Atlas, Thomas,—Taxi, Chain Drive, etc.

**PACIFIC MOTOR CAR EXCHANGE COMPANY**

10 West 62nd Street, New York





# The Clearing House

## of the Motor Car Industry

For Second-hand Shop Equipment • Used Cars • Parts and Accessories



1" one time, \$4.50; 2" one time, \$8.75; 3" one time, \$13; 4" one time, \$16.75. Write for rates of larger spaces and longer terms.

## BIG BARGAINS

**Used Car Department** We have more than 250 cars in our Used Car Department, of almost every make, both Foreign and American, from which to select. Among them are various Runabout models, Touring, Limousine, Landulet and Coupes, at prices ranging from \$150 upward.

**TRANSMISSIONS**—We have a limited number of the celebrated Brown-Lipe Transmissions, regular selling price of which is \$200. Our price, complete with shifting levers and quadrant, \$70.00. Without shifting levers and quadrant, \$60.00. These are 2 speeds forward and 1 reverse.

**Gas Head Lamps:** These lamps are finest made, no solder used in their manufacture, very artistic in design, powerful mirror lens. Diameter of door, 8"; between prop center & 2 or 7 1/4".  
Regular Price, per pair.....\$15.00  
Our Special Price, each..... 2.25

### Splitdorf Magneto:

The most popular instrument on the market. If you want to convert your present ignition system into dual system, here is the greatest opportunity ever offered. Every part is interchangeable. Parts can be obtained from Splitdorf Agency in almost any large city. Instrument can be put in any car adapted for a magneto or for any stationary or marine engine. We will

**TOPS**—SPECIAL INTRODUCTION: To show you what real values we can give, and to demonstrate how much money you can save by dealing with us, if you will cut out this Advertisement and accompany same with your order, we will supply you with a Runabout or Roadster top, made of the best quality of mohair or pantasote, complete with full set of side curtains and dust cover, for \$15.

We will also supply you with the small, medium size, five passenger touring car top, complete with full set of side curtains and dust cover, for \$25.

### We are Headquarters for

Axles, Auxiliary Springs, Ball Bearings, Blitzen Self-starters, Bosch Dash Board Switches, Bosch Dash Coil and Switch, Bosch Magneto, Brown Impulse Tire Pumps, Bumpers, Cables, Carburetors, Casings, Chauffeurs' Seats, Clincher Tire Rims, Clocks, Coils (Splitdorf), Combination Side Lamps, Dust Covers, Dusters, Electric Headlamps, Electric Lighting Systems, Electric Vibrating Horns, Fans, Fenders, Ford Sterling Seat Covers, Gas Headlamps, Gasoline Tanks, Steering Gears, Generators, Goggles, Hand Pumps, Horns, Jacks, J & B Vibrators, Tail Lamps, Bosch Magneto, Remy Magneto, Kurtz Magneto, Splitdorf Magneto, Two-Cylinder and One-Cylinder Magneto, Marine Reverse Gears, Ampere-meters, Motor-driven Horns, One-piece Wind Shields, Prest-O-Lite Gas Tanks, Pumps, Radiators, Rear Tire Holders, Reliners, Rumble Seats, Searchlights, Disco Self-starters, Solid Rubber Tires, Speedometers, Steering Wheels, Timers, Tool Boxes, Tool Kits, Tops, Transmissions, Vacuum Bottles, Vulcanizers, Whistles and Wrenches, etc., etc.

World's  
Largest  
Dealers

**TIMES SQUARE AUTO CO.**

S. W. Cor. 56th St. and Broadway, New York

1210 Michigan Ave., Chicago

World's  
Largest  
Dealers

## YEARLY CLEARANCE SALE

Rare Opportunity—Rock Bottom Prices—State Briefly Your Wants—Quick Action Is Our Motto—These Goods On Hand for a Limited Time Only

### MOTORS AND TRANSMISSIONS AS FOLLOWS:

Thomas 6 cyl., 40 H.P. Stearns 30/60. De-Dietrich 40 H.P. Thomas 6 cyl. 60 H.P. Amplex 40/50. Peerless 30 H.P. Elmore, Atlas, Darracq, Stoddard, Dayton, Chalmers 30, Continental 40, Panhard, Packard, 4 cyl., Packard 6 cyl., Apperson 4 cyl., Hershell-Spillman 6 cyl., Benz 60 H.P., Thomas 4 cyl. 60 H.P., Fiat, Pope-Toledo, Pope-Hartford, Mercedes, Chase, C.G.V., G.J.G., Rutenber, and about 50 others.

### CARS IN STOCK AS FOLLOWS:

Pierce 4 cyl., Pierce 6 cyl. 66 H.P., Packard 1907, 1908, 1910, Chalmers 1910, 1911, 1912; Matheson double chain drive. Amplex, Darracq, Peerless 1907, 1909, 1910; Renault 14/20 and 20/30; Bianchi, Fiat S.G.V., Alco, 6 cyl. Flanders 1914; Cadillac 1910; 1911; 1913 chassis less tires, Itala, Pope-Hartford, Maxwell, Ford, White, Regal, E.M.F., Stearns, Palmer-Singer, C. G. V., Delauney Belville 12 pass. bus; DeDietrich sight-seer 18 pass.; and about 75 more cars and chassis at very low prices.

We also have parts, gears, etc., for every car made, as we are general factory cleaners and price smashers. We also take in trade cars, bodies, and other merchandise.

**PACIFIC MOTOR CAR EXCHANGE COMPANY**

10 West 62nd Street, New York

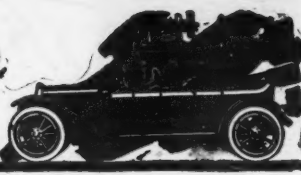




# The Clearing House

of the Motor Car Industry

For Second-hand Shop Equipment • Used Cars • Parts and Accessories



1" one time, \$4.50; 2" one time, \$8.75; 3" one time, \$13; 4" one time, \$16.75. Write for rates of larger spaces and longer terms.

## APCO—FORD SPECIALTIES

There Are Over 125 of Them  
FREE CATALOG

AUTO PARTS CO. Providence, R. I.

## FORD COUPES

Neat, attractive coupe and sedan bodies built especially for Ford cars. Write for price and design.

PAUL MURRAY, Dealer in Automobile Bodies  
518 Ind. Trust Building Indianapolis, Ind.

## ANNULAR BALL BEARINGS REGROUND

We carry a complete stock of reground bearings of all makes and sizes, for immediate exchange.

Get Our Prices  
**AHLBERG BEARING CO.**  
2640 Michigan Avenue  
CHICAGO, ILL.

1790 Broadway 806 Woodward Ave.  
New York City Detroit, Mich.  
93 Massachusetts Ave.  
Boston, Mass.

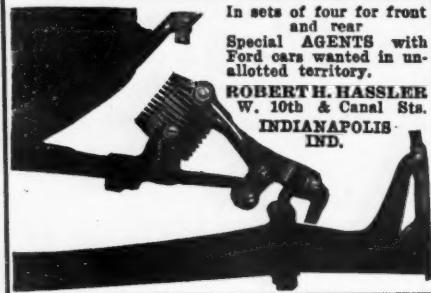
## Builders' Attention

100 shaft drive rear axles.....	Each	\$40.00
100 1-beam front axles.....	Each	10.00
110 five-passenger unupholstered bodies .....	Each	10.00
500 pressed steel frames, suitable for the above bodies.....	Each	5.00
250 spur gear differential gears.....	Each	3.00
100 set 34x4 artillery type wood wheels with quick detachable rims .....	Per Set	6.00
95 locking steering devices, with 18-in. corrugated wheel, 2-in. nickel coast .....	Each	10.00
7,000 stamped steel step hangers.....	Each	.20
Four-cylinder motors, 4x5, with magneto, carburetor and coil.....	Each	95.00
Sliding gear transmissions.....	Each	35.00
Brass or black windshields packed one in a box, complete.....	Each	6.00
300 pairs gas headlights.....	Per Pair	4.50

Send for our bargain sheet and quantity price on the above ad

**Cut Price Auto Supply Co.**  
438 Rush Street  
CHICAGO

## FORD SHOCK ABSORBER

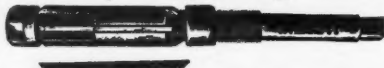


## BOILERS

FOR STANLEY STEAM CARS, Also Grout, Prescott, Locomobile and Mobile Boilers all guaranteed to fit. Special boilers 4 to 60 h. p.; repair work.

Steam Carriage Boiler Co., Oswego, N. Y.

## IF YOU TRY ONE YOU WILL WANT MORE Critchley's Expanding Reame



Reams Odd-Sized Holes

Chadwick & Trelethen, Portsmouth, N. H.



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We can save you money.  
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Look inside your battery through the patented open window. See condition of plates and height of acid.  
Jewel Special 6-60, \$9. 6-80, \$12. 6-100, \$15. 6-100 Starting Battery, \$18.  
Write for Catalog.  
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## Dealers! Attention!!

Our 1914 supply catalog for Dealers only will be ready about April 1st. Send us your name for our Mailing List.

Chicago Automobile Supply House  
1355 S. Michigan Boulevard, Chicago, Illinois

## Holley Carburetor

No Moving Parts

HOLLEY BROTHERS CO., Detroit

## Classified Advertisements

Continued from page 133

ACADEMY OF AUTOMOBILE ENGINEERING—\$35 pays for complete unlimited course on automobiles. Actual repair work and road lessons daily. Best equipped school and shop in Chicago. Evening classes also. Call or write. 1454 S. Michigan Ave., Chicago.

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Learn the Automobile Business  
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THE AUTOMOBILE BUSINESS OFFERS wonderful opportunities. We are placing men from all parts of the country in Good Paying Positions. Send for Booklet O.

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\$2,000 YEARLY BUSINESS OF YOUR OWN; mail order, parcel post; honest and legitimate; small capital; original methods. Write Clement Moore, Specialist, New Egypt, N. J.

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## HOYT AMMETERS AND VOLTMETERS

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# CLASSIFIED ADVERTISEMENTS

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of the  
Motor Car Industry

## MOTOR AGE

Rates—25¢ per line  
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### Cars For Sale

#### A BULLETIN

of used cars is issued monthly by the Used Car Department of the Locomobile Company of America. The Chicago Show Number, No. 1 of the Series Four, is just off the press. It may be had for the asking. If you are not on our mailing list, phone, write or call for this bulletin today.

Visitors at the Chicago Show are requested to inspect the used car department in our salesroom and Service Building, located on Michigan avenue at Twentieth street.

#### USED CAR DEPARTMENT

THE LOCOMOBILE COMPANY OF AMERICA

2000 Michigan Ave.,

Calumet 380

**A LATE DOUBLE "M" FORTY HORSE-**  
power White Steamer, fine condition and fully equipped, including kerosene burner. Has not run three thousand miles. Will sell cheap. Address Box D 469, c/o Motor Age. w

#### A NEW NATIONAL 1913 MODEL.

Seven-passenger, 4-cylinder, Gray & Davis starter and lights, Bosch double ignition; power tire pump, etc. Has only been run very little as demonstrator. Sells for \$3,400; for quick sale at \$2,200. Johnson Motor Car Co., 455 Peachtree St., Atlanta, Ga.

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New 30 H. P. Tour., Elec. L. & Starter..\$950  
New 30 H. P. Roadster, Elec. L. & Starter 900  
New 30 H. P. Coupe, fully equipped..... 850  
New 25 H. P. Tour., fully equipped..... 835  
1913 25 H. P. Tour., Demonstrator..... 550  
1913 25 H. P. Roadster, Demonstrator,  
Elec. L. & Starter..... 500  
1914 35 H. P. Touring, Demonstrator..... 950

These cars are real bargains and guaranteed perfect condition. They must be sold at once to make room for 1914 models.

THE ROSS-STONE CO.  
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IN USED CARS.**  
All guaranteed; prices from \$100.00 to \$2,000.00. Get our prices first.  
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**BARGAIN—FIVE-PASSENGER 1912 KRIT,**  
run 3,800 miles; demonstrate, 25 miles on 1 gal. gasoline, to Chicago parties; extra tire (non-skids), demountable rims; winter heater; acetylene primer; everything complete, \$425. Address Owner, Box 69, Berwyn, Ill.

**FOR QUICK SALE. ONE HUDSON "54"**  
1913 Six Cylinder Touring Car. Perfect condition. Run 1,000 miles. Seat covers. Five Tires. Electric Lights and Starter. Car Cost, with Extra Equipment, \$2,558. Will Sell for \$1,800 Cash.

One New Hudson "34" Four-Cylinder Touring Car. Electric Lights and Starter. Sold for \$1,875. Will Sell for \$1,500 Cash. This Car Has Never Been Used.  
A. R. Manley,  
Mt. Carmel, Ill.

**FOR SALE—A THOMAS FLYER; THIS IS**  
a very high powered car, and will sell at bargain if taken at once; sixty horse-power. Address P. O. Box 461, Louisville, Ky. a

#### FOR SALE CHEAP—TRUCKS

Owing to the location of our new general plant at SPEEDWAY, directly on switch tracks, we have on hand four or five second-hand trucks, two or three tons, not in good running order but just the thing for rebuilders and will sell as a lot at nearly junk prices. Here is your opportunity to get something to work on over winter that will bring in real returns. Write at once.

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**FOR SALE—MERCER COUPE 1913 MODEL**  
newly painted; has been run less than 4,000 miles; will sell for \$2,500. Car in perfect condition. If interested write John B. Ransom, Jr., Nashville, Tenn.

**FOR SALE—ONE 1914 WESTCOTT RUNABOUT;**  
one 1-ton truck; one ½-ton truck; 4 1½-ton trucks; these cars are a bargain for someone, for a quick sale. W. H. Marble, 69 Main St., Brockton, Mass.

**FOR SALE—ONE 6 CYLINDER MATHE-**  
son A1 condition, electric lights and mohair top. Will sell at a bargain. Address W. E. Schaefer & Sons, Ripon, Wis.

**FOR SALE OR TRADE—SEVERAL SEC-**  
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Been used 250 miles. Guaranteed as good as new. Was bought late in 1913. Reason for selling handling other cars. F. O. B. Memphis, Mo., \$375.00. W. P. Briggs & Son, Memphis, Mo.

**MITCHELLS, REBUILT, GUARANTEED**  
These cars are fully equipped. Call or write for further particulars.  
Mitchell Automobile Co.,  
2334-36-38 Michigan Ave., Chicago

**MODEL Y SIX-CYLINDER SEVEN-PAS-**  
senger Stevens Durvea; Model K, 7-passenger, six-cylinder Thomas; 4-passenger Waverly Electric survey, new tires and new elements in batteries; 4-passenger Model 91 Waverly Electric coupe, new iron clad Exide batteries, new tires refinished like new; 1909 5-passenger Mitchell, refinished; 1908 Model S Ford runabout.

2,000-pound Koehler light truck; express body, refinished 1913 model like new; 2,000-pound Monitor truck, rebuilt and refinished express body like new.

1913 Chalmers 5-passenger Model 30, run 2,300 miles, like new; 6-cylinder Model H Franklin. Write for information and bargain prices.

LUCIA PROS. MOTOR CO.  
Green Bay, Wis.

**MUST SELL SEVERAL ROADSTERS AND**  
touring cars. American Storage Co., 5025 Wabash Ave., Chicago, Ill. Tel. Midway 3233.

**NOW IS THE TIME TO MAKE BIG MONEY**  
in livery work with a limousine. We have two Selden limousines both with extra touring bodies and tops and both in good running order. They can be bought for \$700 each or will sell bodies separately. Write or wire before someone else gets them.

Mabbett-Bettys Motor Car Company,  
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#### OLDSMOBILE AUTOCRAT.

Late model sixty horsepower seven-passenger touring car. A-1 condition, run only about 5,000 miles. Make offers; also other bargains.

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**ONE \$1,600 HOWARD AUTOMOBILE, 30 H. P.,**  
in good condition; has run only 1,600 miles; must be sold at once to satisfy claim of \$350. Write Paris Auto & Garage Co., Paris, Tenn.

**RACING CAR FOR SALE—\$1,000; 115 H. P.**  
Special built of chrome nickel steel; R. I. V. ball bearing throughout; 100 miles per hour guaranteed. Will demonstrate any time; all new tires. Address P. O. Box No. 26, Harrisburg, Pa. r

**USED CADILLAC, HUDSON, STUDE-**  
baker, Maxwell, Chalmers, Cole, Ford, Winton, Maxwell, Reo and other good makes of automobiles. Werner's, 1133 Main St., Buffalo, N. Y.

**1912 FORD TOURING, FULL EQUIPMENT,**  
electric lights, tube, tools, all new tires; run only 6,000 miles. Bargain. 52 Howe St., New Haven, Conn. a

**USED BUICK RUNABOUTS, TOURING**  
cars, trucks. Werners, No. 1133 Main St., Buffalo, N. Y.

#### USED CAR BULLETINS

For the past three years we have issued a weekly bulletin of high-grade used cars that we have for sale from time to time.

It gives preliminary information such as the model, number of cylinders, capacity and price.

A number of people have been receiving this list regularly. If you would like to receive it, simply drop us a card.

PACKARD MOTOR CAR COMPANY  
OF CHICAGO.  
2367 Michigan Ave.,  
Chicago, Ill.

**1913 NORWALK 35, 4-PASSENGER, WITH**  
complete electric system and horn. Fully equipped; Firestone Demountable Rims and five practically new tires. To quick purchaser, \$685. T. G. Coppersmith, Martinsburg, W. Va. n

**\$800 BUYS 1½-TON SERVICE MOTOR**  
Truck guaranteed first class condition; 1913 model, new tires, storm top, Prest-O-Lite. Bethard Auto Agency, Richmond, Ind.

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1777 Broadway, New York, N. Y.

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New Stock "Ford Specialties."  
Lowest Dealers' Prices.  
Send for Our 1914 Price List.

JOHN B. STAM & COMPANY,  
Manufacturers of Ford Specialties,

1789 Broadway, N. Y. American Bldg., N. Y.

**ATTENTION GARAGE AND REPAIR MEN!**

You can repair cracked and broken cylinders perfectly by a simple mechanical process.

Cost Not to Exceed 50 Cents  
No Welding or Paste  
Full Directions on Receipt of \$5.00  
Do It Today  
KADOL CO.

607 National Bank Building, Kalamazoo

**ATTENTION—HENRY OWNERS**

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co., Muskegon, Mich.

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Lowest Prices in the History of the Business

WINDSHIELDS—30 CENTS ON THE DOLLAR

Zig-zag or rain-vision, also clear vision. Single or double section—brass, black or nickel. These windshields are all brand new, of the highest grade of material and workmanship. We guarantee them to be exactly as represented or money cheerfully refunded.

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New Flanders "20" Touring Car tops; made of the best mohair, complete with irons, side and storm curtains; can be made to fit Flanders "20", Ford or Buick "10" touring cars; also other small four-passenger cars. Price \$11.85.

**GET OUR PRICES**

We are the greatest money savers handling high grade accessories in the business. No matter what you need in accessories, get prices before you buy. We can save you from 25 to 100 per cent on anything in accessories.

**ERWIN GREER & COMPANY**

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Accessory Department.

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Send for our latest illustrated cut-price catalogue of automobile accessories. Liberty Tire Co., 102 Chambers St., New York, N. Y.

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You can reduce your auto upkeep practically one-third by purchasing your supplies through our new free Special Catalog. This book contains a complete line of standard auto goods. It describes and illustrates Justice Auto Casings and Tubes, standard construction throughout and quotes prices that save you at least 25%. We guarantee satisfactory service from them. Mail us a postal requesting Catalog No. 72M80. Sears, Roebuck & Co., Chicago, Ill.

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Cushions and Backs, new or recovered; Carpet Rugs; Curtains, etc. W. H. Newton & Son, 120 Elm St., Cortland, N. Y.

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Seat covers and body building, remodeling and trimming. Write for prices.  
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250 new panel top delivery bodies, some panel top, some open express with flare boards. Will fit three-fourths of autos made. \$28 to \$45. Folding plate glass windshields, \$10 complete. New 32-inch wheels with solid rubber tires, only \$12 each. Benedict Co., 63 Winder St., Detroit, Mich.

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Booth and Continental our specialty. Send for our rim part catalogue.

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All Types and Sizes.  
We also repair or exchange all makes of ball bearings.  
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Exide Storage Batteries, 6 volt, 40 amp. \$ 7.00  
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OF OXY-ACETYLENE WELDING PLANTS,  
including Carbon Burner.  
(With gas drums owned not loaned.)  
\$175.00 AND UPWARDS.

Most economical, light weight, non-back-firing torch made.  
Apparatus price including carbon burner (with gas drums loaned) from \$67.50 upwards.

Write us today for details and booklet on welding apparatus.  
VULCAN PROCESS COMPANY,  
25th and University Ave. S. E., Minneapolis, Minn.

**CINO RACING MOTOR COMPLETE WITH**  
double spark Remy racing magneto. \$175.00;  
25 H. P. Overland motor. \$100.00; 50 H. P. Pope Toledo engine. \$125.00; Bosch D-II-4 duplex magneto. \$30.00; Model F Buick parts for sale. Four 30x4 casings and tubes, in good condition. \$30.00.

**AUTO SALVAGE CO.,**  
1436 Wabash Ave., Chicago.

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E.M.F. Flanders, Buick, Regal, etc. Complete outfit with brass lock open pedal. \$1.50.  
Lincoln Machine Shop, Lincoln, Ill.

**DOES YOUR MOHAIR AND CANVAS TOP**  
leak? Coleman's Waterproof Filler will make it rain proof. It will not stiffen or change the color. Virginia Waterproofing Corp., Arcade Bldg., Norfolk, Va.

**DON'T LET YOUR RADIATOR FREEZE—**  
TENBELO is a perfect non-freezing mixture. Gallon can \$1.00. Post extra.  
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We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

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**SAGER FORD SHOCK ABSORBERS.**  
30 days' free trial. Write for special prices.  
Ford Fan Belts, 25c.  
FRED ALLEN AUTO SUPPLY CO.,  
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**FORD DEALERS.**

Get our agency for Ford Spare Wheels.  
All wheels interchangeable.  
"Angler's," Streator, Ill.

**FORD OWNERS AND DEALERS!**

You will save trouble and money by installing our timer elevating device.  
Ford Parts Specialty Co.,  
1211 Main St., Richmond, Ind.

**FORD DEALERS AND OWNERS!**  
Your cylinders, all four holes reamed alike by micrometer, new pistons, rings, and hardened pins fitted complete \$16. The Kent Auto Co., Denver, Colo.

**FORD, HUPP AND MAXWELL**  
Muffler cut-out, machined ready to attach, including lock open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill. o

**FORD OWNERS AND DEALERS!**

Does oil work by the pistons, covering plugs with soot? And that knock you have been unable to locate all summer. Write us for prices on reboring and new pistons fitted.  
STANDARD AUTO CO.  
Coldwater, Mich.

**FORD-OWNERS****K. W. MASTER VIBRATORS**

Reg. Price \$15.00 OUR PRICE \$12.50  
Latest type with kick switch  
Do you want our Catalogue?

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CLEVELAND'S LARGEST SUPPLY HOUSE  
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**FORD OWNERS, OUR PURE WHITE FELT**  
washers for Ford rear axles, stop grease leak. 20c set four, prepaid. Angier's, Streator, Ill.

**FORD OWNERS—STOP THAT RATTLE!**

A large percentage of the rattle in a Ford car is caused by the crank. Hold the crank rigidly in place while running and the rattle stops.

**KIMBALL'S CRANK HOLDER & LOCK**

stops that rattle to perfection, and is a first-class theft preventive. Can be attached to car in five minutes without alterations. Holder slips under spring clips; padlock fits around crank-handle and through holder. Neatly enameled, it adds to appearance of car. Price with lock, \$1.50.

Agents Wanted

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Crystal Falls, Mich.

**FORD OWNERS! TRY OUR NEW IDEA**  
patented MUFFLER CUTOUT, for bad roads and hills. Cuts out all gas and back pressure. A real cutout. Double the power of other makes. Satisfaction guaranteed or money back. Three dollars, delivered. AUTO IMPROVEMENTS CO., Bristol, R. I.

**FORD OWNERS—WE CAN MAKE YOUR**  
car the easiest rider made with light or heavy load; no jolt, no jars, no upthrow. Write us. Thomas Auxiliary Spring Co., Canisteo, N. Y.

**FORD SEAT COVERS MADE OF DOUBLE**  
texture waterproof cloth, edges leather bound. Cover all upholstery and doors. Price, including top hood, roadster \$11.00; touring car \$18.00. Postpaid.  
Truscott Auto Supply Co., St. Joseph, Mich.

**FOR SALE**

Ford Taxicab Body. No. 1 condition.  
E. B. Collins Motor Co.,  
Danville, Ill.

**FOR SALE AT A BARGAIN. NEW 5x6**  
four-cylinder, governor controlled engine, fully equipped with carburetor, magneto. Will sell for much less than cost. Fred Hanson, 570 Prior Ave., St. Paul, Minn.

**FORD T. OWNERS.**

Foot throttle or accelerators. \$1.50. Lincoln Machine Shop, Lincoln, Ill. c

**FOR SALE CHEAP, ONE 60 H. P., 4-CYL-**  
inder Imperial Motor, almost new, including transmission, \$175.00. Leslie James, Richland Center, Wis.

**FORE-DOORS AT CUT PRICES**

Mr. Auto Owner and Dealer: If your car is without fore-doors, write today for bargain prices; to reduce stock.

DEPT. D, AUTO SPECIALTY MFG. CO.,

326-30 E. Market St.  
Indianapolis, Ind.



**FOR SALE—ONE NEW JACK SHAFT AND** transmission with sprockets for 1½-ton truck at \$0.50 on the dollar. Write Frank Hoag, 91 Elm St., Cortland, Cortland Co., N. Y.

**FOR SALE—VERTICLE SPINDLE MILLING** Machine, like new, at \$0.50 on the dollar. Just right for garage work. Write Frank Hoag, 91 Elm St., Cortland, Cortland Co., N. Y.

**FOR SALE—1911 MODEL LIMOUSINE** Body for Pierce Arrow Model "48." In perfect condition; never been used but once and then for just one week. Can be had for \$975.00; original cost \$2,250.00. A Big Bargain. Queen City Motor Co., Beaumont, Texas.

**FOR SALE—20 SET OF 34" WHEELS** equipped with 2½" clincher rims. 20 set of 36" wheels, equipped with 3" clincher rims. 12 spokes to the wheel. A-1 bargain. Address Box E 2, c/o Motor Age.

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We manufacture front doors for all old models. We can give you prompt shipment and guarantee the doors to fit or money refunded.

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1332 Michigan Ave. Chicago, Ill.

#### GUARANTEED RADIATORS.

Not always necessary to buy new radiators. New cores can be furnished for frozen or damaged radiators. We build the fin and tube type. Guaranteed copper fins and tube.

Ford Model T core.....	\$14.00
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Hupmobile 32.....	30.00
Warren 30.....	25.00
Warren 40.....	30.00
E. M. F., Patterson, Cole 30.....	30.00
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The above is the price of cores only. Where casings are damaged beyond repair, add \$5.00.

All our work guaranteed absolutely new—built to your order. Do not be misled, cores cannot be rebuilt. Write for price on radiators not mentioned in above list.

**HURON RADIATOR & LAMP COMPANY,**  
253-255 Jefferson Avenue,  
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Terms: Cash with the order.

#### GENUINE BARGAINS

In 25-30 H. P. four cylinder automobile motors; also high grade stationary engines suitable for garages. We solicit all kinds of machine work and guarantee satisfaction.

**ALFORD MOTOR & MACHINE CO.,**

Goshen, Ind.

#### HAVE AN EXPERT BUY

and inspect for You.  
Machinery, Tools, Hardware and  
Garage Equipment.

Mechanical or Electrical  
H. JONSON  
OWNERS AGENT  
207 Dyckman St.  
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**LEVENE MOTOR CO.,**  
Sole manufacturers and distributors of  
repair parts for

LION MOTOR PARTS CO.  
LOUIS J. BERGDOLL MOTOR CO.  
MIDLAND MOTOR CO.

We have purchased the entire stock of parts, jigs, patterns, drawings, etc., of the above mentioned companies, and are prepared to fill orders for repair parts for all models of these cars; give name and number of cars when ordering parts. Price list on application.

**LEVENE MOTOR CO.,**  
2200-2218 Diamond St., Philadelphia, Pa.

**MR. FORD OWNER AND DEALER—THE** (TOWNSAN VALVE ADJUSTER AND SILENCER) will quiet your motor, save you dollars on repairs. Sold by jobbers and dealers everywhere. If your dealer cannot supply you send \$1.50 and we send prepaid. Townsan Auto Spec. Co., Mitchell, S. D.

#### MORA REPAIR PARTS

We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars.  
Philadelphia Machine Works,  
67 Laurel St., Philadelphia, Pa.

**MAGNETOS: WE HAVE 2,000 MODEL X** Splitdorf Magnetos, new. Price, without coil, \$17.50 each; with coil, \$25.00 each. The regular price of these is \$75.00.

We also have other makes of magnetos at cut prices—in fact, everything for the automobile. Send for "OUR PRICE WRECKER"—the greatest money saver in the world.

**TIMES SQUARE AUTO CO.,**  
1210 Michigan Blvd., Chicago, Ill.  
S. W. cor. 56th St. & Broadway, N. Y. City.

#### MICHIGAN CAR OWNERS

Having purchased all necessary parts to maintain the best service on Michigan cars, we are about to issue a reduced price list; all owners of Michigan cars will be benefited by sending application, giving name, address, model of car and date of purchase at once.

**PHILADELPHIA MACHINE WORKS,**  
61 to 71 Laurel St.,  
Philadelphia, Pa.

**NEW FORD TOURING CAR BODY WITH** top and side curtains, complete, painted and upholstered, crated f. o. b. Toledo, \$68.00. Macinnis Bros., Toledo, Ohio.

#### PAINT YOUR CAR YOURSELF

Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

**ARSENAL VARNISH COMPANY**  
Auto Dept., Rock Island, Ill.

#### PEREMPTORY SALE.

Radiators, Steering Gears, Front and Rear Shaft Drive Axles with Artillery Wheels having demountable rims, Pressed Steel Frames, Steps and Hangers, Springs, half and full elliptic, Nuts, Bolts, Clips, all suitable for cars up to thirty horse power.

Winton "K" 4-cylinder motor with Remy magneto and coil.....\$198  
Winton "K" front and rear axles with wheels.....125  
G. J. G. racing machine, 70 M. P. H.....1250  
Special racing machine, 90 M. P. H.....\$500

Write for detailed specifications and information to

**G. J. G. MOTOR CAR COMPANY,**  
White Plains, N. Y.

#### PEERLESS CUSHION DRESSING

Brightens and renews all leather seats and cushions. Will not wash or rub off. Dries in twenty minutes. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

**NOTICE—FORD OWNERS AND DEALERS.** Send 15 cents for our new Ford gasoline gauge or 25c for our new Ford oil gauge, prepaid. Large Ford specialty catalog mailed free. The Browne Supply Co., Toledo, O.

#### PEERLESS LAMP ENAMEL

A black enameled lamp with one coat. Not affected by heat or cold. Does not crack, chip or peel. Made in either a gloss or dull finish. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

**OXY-ACETYLENE WELDING AND CUTTING** Machine. The Admiral Welding Machine is built for service by men who know; large capacity; self-generating; portable; perfect for all classes of work. Send for booklet, "Welding and Cutting." Price, with Welding, Cutting and Carbon Removing Torches, all Filler Rods, Fluxes, Chemicals, etc., ready to begin earning big money, \$250. We do expert welding; prices right. Admiral Welding Machine Co., 1331 Walnut St., Kansas City, Mo.

#### PEERLESS LINING DYE

Makes all faded, stained and spotted linings a black uniform color. Makes old linings like new. Ask your dealer.

**THE COLUMBUS VARNISH CO.,**  
Columbus, Ohio

#### RADIATORS.

"Put up a good front" by putting on our genuine guaranteed cellular radiators (commonly called Honeycomb).

Ford T.....\$25.00  
Buick 10-24-25-34-35-36.....27.50  
Buick 16-17-19-26-27-28.....35.00  
Buick 21-38-39-43.....37.50

Equally attractive price on all popular models. Every one a new complete radiator. Five per cent discount allowed for cash with order.

**DETROIT RADIATOR & SPECIALTY CO.,**  
963 Woodward Ave., Detroit, Mich.

#### PEERLESS MOHAIR TOP DRESSING

Waterproofs leaking tops and makes old tops like new. Sold by garages, dealers and jobbers.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

#### RADIATORS

Every radiator guaranteed absolutely new, not a reconstructed one.

In stock for immediate shipment.

Ford Model "T".....\$18.00  
Buick 10-14.....27.50  
Buick F-16-17-19-26-27-28.....35.00  
Hudson 20.....33.00  
Chalmers F-40.....30.00  
Hupp 32.....25.00  
E-M-F 30.....30.00  
Anhut.....15.00  
Northern C.....32.00  
Wayne 30.....35.00  
Special 40 H. P.....15.00  
5% discount allowed for cash with order, otherwise one-third cash with order, balance C. O. D.

We also have all repairs for the Wayne, Queen and Northern cars

**AUTOPARTS MANUFACTURING COMPANY**  
453 Trombly Avenue, Detroit, Mich

#### PEERLESS LEATHER TOP DRESSING

A preserver for all rubber, leather and pantasote tops and curtains. Makes old tops like new. Ask your dealer.

**THE COLUMBUS VARNISH CO.**  
Columbus, Ohio

**RADIATOR COVERS FOR ALL CARS.** Every car should have a radiator cover in cold weather.

Write for prices.  
Auto Cape Top Co.,  
2334 Michigan Ave., Chicago, Ill.

#### REPAIR PARTS FACTORY

Repair and service parts in stock always. We own the patterns, tools, etc., for Elmore, Warren, Michigan, Marquette, Rainier, DeLuxe, Welch, Demot, Anhut and many other cars.

**PURITAN MACHINE COMPANY,**  
Detroit, Mich.

**RADIATOR COVERS**  
Full stock for all cars  
Prompt shipment

**FORD COVERS, \$1.40; OTHER COVERS, \$2.50**

**SEND FOR MY TIRE PRICE LIST.**

**ALLEN S. SINSHEIMER**  
1505 Michigan Ave., Chicago



## SOLD AT AUCTION.

## THE MICHIGAN MIGHTY 40.

IF YOU OWN A MICHIGAN CAR SEND TO US FOR PARTS. IF YOU WANT A MICHIGAN CAR WE CAN FURNISH IT COMPLETE IN PARTS. BELOW IS A LIST OF THE PARTS:

1 Pressed steel frame with fittings....	\$ 10.00
6 Pressed steel step hangers, drilled..	2.40
1 Lewis I beam axle.....	35.00
1 Full floating rear axle, 3 1/2-1 ratio..	80.00
2 Universal joints, axle to transmission .....	14.40
1 Torque assembly .....	10.00
1 Detweiler steering gear.....	20.00
1 40 H. P. Buda Motor.....	150.00
1 Magneto and coil.....	25.00
1 Vesta lighting generator.....	53.75
1 Cooling fan and bracket and belt...	5.00
2 Foot pedal levers and pad.....	2.00
1 Clutch yoke shaft and levers.....	2.35
2 Brackets for clutch shaft, R. & L....	2.50
1 Cone clutchless joint.....	16.00
1 Pair joints between clutch and transmission .....	12.00
1 Transmission, with C. control levers, 3 speeds and reverse.....	100.00
12 Yoke ends for brake rods.....	2.40
1 Muffler for 40 H. P. motor and tube.	7.50
1 Ball and socket drag link, 24" long.	3.50
2 3/4" Elliptic rear springs, 2 1/4"x50", 5/8" hole .....	18.00
2 3/4" Elliptic front springs, 2 1/4"x37", 5/8" hole .....	12.00
10 2 1/4" spring clips with nuts.....	2.00
8 Spring bolts, 5/8" diameter with nuts	4.00
1 Carburetor, 1 1/4" Holley.....	5.00
1 Set rear tire holders.....	2.00
1 Five passenger body upholstered....	100.00
1 Set of four fenders.....	16.00
1 Pair running board boxes.....	4.50
1 Pair running boards for top of boxes	2.00
1 Set 34"x44" Firestone demountable wheels and rims.....	20.00
1 Honeycomb type radiator.....	30.00
1 Radiator hood .....	9.50
1 Radiator hood rest and dash.....	3.50
2 Radiator hood ledges.....	1.00
4 Hood hooks .....	.80
1 Starting crank for motor with bracket .....	4.50
1 Gasoline tank, stop cock and tubing	3.25

Special price for complete outfit, boxed, on board cars.....\$575.00

## SPECIAL BARGAINS.

Electric starter driving chains.....each	\$ 1.00
Electric Auto Lighter Co. auto lighter, complete .....	25.00
Jones speedometers, No. 40, with odometer, complete .....	12.00
Lock Washers, 3/16" to 3/4" assorted .....	.80
Vesta magneto generator complete with amp meter .....	25.00
Michigan-40 double rear tire brackets .....	1.50
Electric horns complete.....	2.00
Electric tail lights with bulb.....	1.25
One-ton truck steering gears.....	7.50
Detweiler steering gears, 18" corrugated wheel, 2" nickel plated post....	15.00
E. Z. gas starter for Ford cars.....	5.00
18" mahogany laminated corrugated rims .....	1.00
Ford gas headlights.....per pair	4.50
3-strand primary cable.....per ft.	.06
Starter cable .....	.12
Secondary cable .....	.03
Oakland windshields, nickel plated, complete with fittings.....	7.50
Mezger automatic windshields, brass or black, complete with fittings.....each	6.50
Michigan 5-pass. bodies in the white..	25.00
Tops to fit most any car.....	18.00
Send in your sizes.	
Rumble seats.....per pair	20.00
Midland mahogany dashes.....each	.50
Truck radiators, slightly used.....each	15.00
Solid rubber tires, 2x37.....each	5.00
Rushmore generators, brass.....each	2.00
6 cylinder Herschell-Spillman motors .....	275.00
Midland multiple disc clutches.....each	10.00
4 cylinder Cameron air-cooled motors .....	75.00
Olds honeycomb radiators.....each	30.00
Clincher beads, any size.....each	.75
Midland pressed steel frames, 5-pass..	5.00
Midland frames, 6 cylinder.....	10.00

We will exhibit at the Chicago Auto Show, Armory, balcony space 13, 14, 15.

## AUTO PARTS CO.,

737-739 Jackson Blvd.,

Chicago, Ill.

## RADIATORS.

NEW.	NEW.
Ford T .....	\$17.00
Buick F, 16, 17, 19, 26, 27, 28.....	30.00
Buick 10, 14, 32, 33.....	22.00
Hudson 20 .....	28.00
Hupp 1910-1911 .....	27.00
Overland .....	30.00

All other makes at equally low prices. Send us your old radiator for repairs or exchange on a new one.

## TIMES SQUARE AUTO CO.,

1210 Michigan Ave., Chicago, Ills.  
56th & Broadway, New York City.

**RADIATORS THAT COOL THE MOTOR** and give satisfaction are W(RIGHT). Built for all cars. We have in stock—  
Ford T. and all Buick models.  
Michigan F-1911. Velle 30-1909.  
Oakland 24-1911. Parry 1910.  
Hudson 20-1910-11. Hupmobile 1910-1911.  
**WRIGHT COOLER AND HOOD CO.,**  
8th St., Muskegon, Mich.

**SCHEBLER MODEL "L" CARBURETORS,** new, 1 1/2-inch, \$8.00 each. Order early, Kent Motor Car Co., Kenosha, Wis.

**"SAVE YOUR GASOLINE."**  
We have 150 Rayfield carburetors, regular \$20.00 kind. Our price, \$8.20 while they last.  
**PURITAN MACHINE CO.,**  
415 Lafayette Blvd., Detroit, Mich.

## SEAT COVERS.

Ford, Overland, Studebaker owners send for our money-saving prices and samples of our materials.

**GLOBE SEAT COVER CO.,**  
Dept. M., Racine, Wis.

## SHINAUTO—THE GREAT PRESERVER.

Keeps auto. like new without washing. Prevents cracking and checking of varnish. Makes old cars like new. Guaranteed. Saves paint bills. Trial can 50c by mail. Enough for two months' treatment.

**SHINAUTO MFG. CO., INC.,**  
1137-1139 No. Illinois St., Indianapolis, Ind.

**STOP THAT LEAK IN YOUR RADIATOR** with one ounce of Overton's Radiator Leak Compound. A pound can by parcels post for 35c cash. N. L. Overton, 1109 4th Ave., Council Bluffs, Iowa. Prices to Dealers.

## THAT MYSTERIOUS RAG DUSTER.

For dusting and polishing automobile bodies, windshields, lamps, pianos or any other polished surface. House Size 25c. Automobile Size 50c. Sent to any address upon receipt of price. If not satisfied, return duster and we will refund purchase price.

**THE GEM SUPPLY,**  
1036 So. Main St., Waterbury, Conn.

## THE JONES AND BUCKOKE J. &amp; B.

## AUTOMATIC FUEL SAVER.

Unique in operation, self-contained, gives maximum results. A proposition that will interest agents and dealers.

**JONES & BUCKOKE,**  
1413 Michigan Ave., Chicago, Ill.

**TOPS BUILT, RECOVERED AND REPAIRED.** Also Top Covers, Radiator Covers, Luggage Cases, Celluloid, etc. C. G. Meyer & Son, Tiffin, Ohio.

**TRUFFAULT-HARTFORD SHOCK ABSORBERS:** \$45.00 kind; \$20.00 set of four.  
**PURITAN MACHINE CO.,**  
417 Lafayette Blvd., Detroit, Mich.

**UNION OXY CARBIDE CO.**  
Manufacturers of Portable (weight 40 lbs.) and stationary welding, cutting or lighting plants; supplies of all kinds. Agents wanted. Fulton & Enfield Sts., Brooklyn, N. Y.

**TOURING ROADSTER, RACING BODIES.** Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.

Auto Sheet Metal Works,  
1534 Michigan Ave., Chicago.

**TWO KNOX BODIES, COMPLETE SIDE** curtains, top, etc., \$25; 2 pair side lamps, \$1.50; 2 sets 3-1 gears, \$9; steering wheels, \$1; windshield, \$5, and a lot of other equipment. Will buy or trade for racing magneto and body. A. J. Parcell, 263 S. State, Elgin, Ill.

## VULCANIZING.

Easy learned. Book 50c.  
**VANDERPOOL'S, SPRINGFIELD, O.**

**"WE HAVE JUST TAKEN IN EXCHANGE** 2-ton Saurer chassis in fine condition. 4 speed transmission direct on 3d. 4 cyl. long motor. Bosch high tension magneto.  
Condon, 2635 Wabash Ave., Chicago.

**WE MAKE FORD RACING TYPE BODIES** in several models for immediate delivery.  
Auto Sheet Metal Works,  
1532 Michigan Ave., Chicago, Ill.

**WESTON MOTT HIGH GRADE REAR** axles, \$45.00. Other bargains, too.  
**PURITAN MACHINE CO.,**  
413 Lafayette Blvd., Detroit, Mich.

**WELDING PLANT, CUTTING PLANT,** carbon removing outfit, or a combination of all of these at from \$75.00 to \$175.00 for high or low pressure system. For full particulars, address Bermo Welding Apparatus Co., Omaha, Nebr.

## WINTER IS HERE

And there is no question but what **FORE DOORS** improve the appearance of any car as nothing else will, but when compared to the added comfort and pleasure which they give to both driver and passenger, appearance becomes a secondary condition. **FORE DOORS** installed on any make of car. Also write me about commercial bodies for the Ford car.

**T. F. MURPHY**  
1546 Michigan Ave., Chicago, U. S. A.

**50 NEW PRESSED STEEL FRAMES, 163"** long, 34" wide. Each, \$10.00.  
Send for sketch.  
Lucas & Son, Bridgeport, Conn.

## \$150—NEW—\$150

Auto Assemblies including 22 H. P. Power Plant. Build yourself and save manufacturers' and dealers' profits. New Fore Door bodies—30"x72", trimmed and painted, \$30. New Roadsters completely equipped and ready for the road, \$325. Also big bargains in frames, axles, tanks radiators, wheels, etc. If you are building a small car, don't miss this sale. Also 16 H. P. 2-cycle marine motors, \$90.00.

**T. B. MOORE,**  
1120 Grand River Ave., Detroit, Mich.

## 1909 E. M. F. PARTS

at less than manufacturer's cost.  
One 1909 E. M. F. transmission and rear axle complete with wheels and tires.  
"Gears new".....\$50.00  
One crankcase with crankshaft and bearings, camshaft and bearings and gears, flywheel and clutch..... 50.00  
Two 1/2 elliptic springs..... 5.00  
Two full elliptic springs..... 10.00  
One front axle with spindles..... 8.00  
Two front wheels..... 8.00  
One pair cylinders..... 10.00  
One steering gear..... 12.00  
Corken's Garage, Burlington Junction, Mo.

## Cycle Car Accessories

## CYCLECAR

We will furnish designs and blue prints for either tandem or side-by-side seating, also all necessary parts to build same, blue prints and full information, \$5.

We are prepared to furnish parts which have been thoroughly tested out on the road—no experiment. Front and rear axles, springs, steering gears, wheels and frictions. Write for information.

Fenton Engineering Co., Fenton, Mich.

## CYCLE CAR BUILDERS.

When building a cyclecar why not build a racer? Have 3-cylinder 30-35 H. P. air-cooled motor, V type, 4 1/2"x5 1/2", weighs 110 lbs. This motor is brand new, never used, and complete with manifolds, carburetor and timer. Price \$200. Full particulars, photo and blueprints for 25c in stamps. Bongartz, 2743 Ave. D, Brooklyn, N. Y.



**PARTS FOR CYCLE CAR OR LIGHT RUNABOUT**

High Grade Pressed Steel Hubs  
Steering Knuckles  
Springs and transmissions

BRENNAN MOTOR MFG. CO.,  
103 Grape St., Syracuse, N. Y.

STEERING KNUCKLES, YOKES, FRONT  
axles, springs and wheels.  
Minneapolis Motor Co. Agency,  
1123 Michigan Ave.,  
Chicago.

**Wearing Apparel**

FUR LINED OVERCOATS AT ONE-  
fourth value. Manufacturers' samples.  
Gentlemen's imported black broadcloth over-  
coats, lined with finest Australian mink,  
large handsome Persian lamb collar. All  
sizes. Retail value, \$120. While they last  
will be sacrificed for \$35 each. First come  
first served. You take no risk. Examine  
and try on before paying. Write today,  
stating size, enclosing express charges only  
and coat will be sent at once. E. Roberts,  
Room 7, 160 West 119th St., New York.

**Parts and Accessories  
WANTED**

WANTED—A FOUR CYLINDER 60 H. P.  
motor having large bore and stroke, to de-  
velop not less than 50 H. P. at 1000 R. P. M.  
Must be in first class condition. Jackson Park  
Garage & Machine Co., 6416-18 Stony Island  
Ave., Chicago, Ill.

WANTED—A HEALD CYLINDER GRIND-  
ing machine, cheap for cash. Address Box  
141, Minneapolis, Minn.

WANTED TO BUY—PREST-O-LITE AND  
other make gas tanks for cash. Walter R  
Ebert, 959 34th St., Milwaukee, Wis.

**Cars Wanted****AUTO WANTED**

160 acres of nice level land, good soil, all  
fenced, no rocks or stumps, near neighbors.  
good crops, at \$20.00 per acre. Will take a  
good car as part pay. State price and de-  
scribe fully first letter. No incumbrance and  
title good.

A. L. STONE,  
Texline, Tex.

AUTO WANTED—WILL LOAN YOU  
money on your car or sell same. American  
Storage Co., 5025 Wabash Ave., Chicago, Ill.  
Phone Midway 3233.

**FIFTY CARS WANTED FOR CASH.**

Have customers waiting; if you want to  
sell your car quick, consign it to us; no  
charge whatever; we get our profits over  
your net figure; it is your privilege to re-  
move car at any time without notice; will  
send for your car free within 200 miles.

American Used Motor Car Co.,  
Brooklyn, N. Y.

500 Bergen Street, Near Flatbush Ave.

TO EXCHANGE, S. D. LAND FOR A GOOD  
auto. Give full description of auto and  
price in first letter.  
Box 91, Edgeley, N. Dak.

TO TRADE HYDROPLANE RUNABOUT,  
safe, fast and dry, designed by John W.  
Hacker, for motor car in good condition.  
A. B. Bechaud, Fond du Lac, Wis.

**Situations Wanted****A MAN OF ABILITY**

who is now engaged in wholesaling and ter-  
ritorial development of medium priced cars  
desires to identify himself in a like capacity  
with a large distributor of motor cars. Have  
handled Overland, Studebaker and Chalmers  
cars. Can show an A1 record. If you need  
a live wire along this line, address Box E 6,  
care Motor Age.

POSITION WANTED AS MANAGER OF  
garage or sales agency. Have had several  
years' experience in business for myself and  
know the automobile business thoroughly.  
Address Box E 8, c/o Motor Age.

CHAUFFEUR DESIRES PERMANENT  
position with party requiring thorough re-  
liable driver and repairman; no objection to  
traveling or final location; have had nine  
years' experience in manufacturing, repairing  
and driving of automobiles; two years in  
operating one of the best garages in the  
state of Indiana; married and absolutely  
sober; can give the best of references. Ad-  
dress C. J. Macon, Kentland, Ind.

EXPERIENCED SALESMAN, HAVING  
over 5 years' experience selling accessories.  
desires to make change; has an established  
business in over eight states; would like to  
connect with manufacturer or jobber, where  
the services of a business producer would be  
appreciated; has A1 references. Address Box  
E 5, c/o Motor Age.

POSITION WANTED BY EXPERIENCED  
auto repairer and shop foreman; to be  
taken up about the first of March. Can  
furnish good reference. Must be steady the  
year around, with good salary. Address Box  
E 9, c/o Motor Age.

STENOGRAPHER — EIGHT YEARS ON  
auto row; seeks position. High school  
graduate; highest references. Address Box  
E 13, c/o Motor Age.

WANTED—POSITION AS REPRESENTA-  
tive in either Japan, Australia or South  
America. Speaks French and Japanese. Six  
years experience as automobile salesman.  
Now employed by one of the highest class  
automobile factories in America. Best ref-  
erences. Write Box D 595, care of Motor Age.

WANTED—POSITION BY FIRST-CLASS  
auto mechanic as chauffeur for private  
family; ten years' practical experience any  
make of car; do own repairing; strictly sober  
and reliable; references: married. Address  
F. Meyer, 413 Eleventh St., Milwaukee, Wis.

**Help Wanted**

ADVERTISING AND SALES MANAGER  
for automobile and truck company; must  
be a No. 1 man, capable of holding down a  
first-class proposition; \$3,000 to \$5,000. Com-  
municate with Mr. Harrison, The Engineer-  
ing Agency, 1662 Monadnock Block, Chicago,  
Ill.

AUTO ACCESSORY SALESMAN WANTED  
to sell our guaranteed auto tire reliners,  
double locks, inner and outer shoes, etc.  
Liberal commissions and exclusive territory.  
AMERICAN RUBBER PRODUCTS CO.,  
24 So. Clinton St., Chicago, Ill.

DISTRIBUTOR WITH LARGE TERRI-  
tory in Northwest Texas wants adver-  
tising and sales manager. Have Hudson,  
Krit and Maxwell lines. Climate ideal and  
roads finest in the world. Address W. E.  
Groendycke, Amarillo, Texas.

MEN AND WOMEN GET GOVERNMENT  
jobs; \$65 to \$150 month. Examinations  
everywhere soon. Write immediately for  
free list of positions now available and  
Spring Examination schedule. Franklin In-  
stitute, Dept. C-71, Rochester, N. Y.

POSITION OPEN FOR MANAGER  
First class garage; best location in city of  
eighteen thousand population. Must have  
some money. Address, quick, G. F. O'Don-  
nell, Jacksonville, Ill.

ROAD MAN—SIDE LINE; COMMISSION  
\$6.40 each sale, appointing agent and \$1.40  
on agents' sales for introducing appliance to  
auto owners, garages or shops. Small  
sample. Autolite Deflector, Room 404, 38 So.  
Dearborn St., Chicago.

**SALES MANAGER WANTED.**

Long established concern, manufacturing a  
line of heavy duty motor trucks, has a place  
for a sales and advertising manager. He  
must be a man of the very highest order of  
ability, with a record for making good and  
preferably experienced in selling motor  
trucks. All correspondence confidential.  
Address Victor L. Brown, West Allis, Wis.

WANTED—A NO. 1 REPAIR MAN. ONE  
especially good on ignition and self  
starters. In small country town in Illinois.  
Please state salary wanted and number of  
years experience in first letter. Good propo-  
sition open for right kind of man in partner-  
ship or a steady job the year round. Clyde  
C. Hessman, Buffalo Prairie, Ill.

TRAVELING SALESMEN  
Side line. I manufacture an article that  
sells to every repair shop and garage.  
D. Ogden, Columbus, Ind.

**WANTED!****A SALES MANAGER.**

A newly established corporation control-  
ing a patented device absolutely necessary  
to every automobile owner desires a live  
wire sales manager.

This man must know the automobile busi-  
ness thoroughly. He must be active and  
aggressive because there are infinite pos-  
sibilities for success in this particular field.  
Must also know men and business methods  
thoroughly.

In order that we secure his best interests  
and whole-hearted effort we ask that this  
man invest \$3,000 in the business.

Recompense will be on a salary and com-  
mission basis. Here is your chance.

If you wish to become independent—here  
is your chance.

Write stating age and experience and  
giving fullest reference.

Address Box E 14, c/o Motor Age.

WANTED—EXCLUSIVE FORD REPAIR  
man. Must be expert at overhauling Ford  
cars and of good habits. State experience  
and wages. Moore Automobile Co., Grand  
Forks, N. D.

WE ARE CONSTANTLY IN TOUCH WITH  
Employers requiring High-Grade Engineer-  
ing service. Are you listed with The Toledo  
Engineering Agency, Toledo, Ohio?

**Wanted—Agents**

AGENTS WANTED—SOMETHING NEW—  
just invented; sells to every automobile  
owner. Spark Plug Tester; locates trouble  
instantly, without removing plug. Sells on  
sight. \$1. half profit.

GENERAL AUTOMOBILE SUPPLY CO.,  
Dept. 2,  
212 E. 5th St., Cincinnati, O.

MAKE \$50 TO \$100 A WEEK SELLING THE  
Doxameter, the only automatic guaran-  
teed gasoline saving device for autos and  
stationary engines. Saves 25 to 40%. Retail  
price \$5. Send \$3 for sample and particulars.  
DOXAMETER SALES CO.,  
2132 S. Michigan Ave. Chicago, Ill.

YOU CAN GREATLY INCREASE YOUR  
income by representing our line of light-  
ing systems; our

**MATCH LIGHTING LAMPS**

sell like wildfire both in town and rural  
districts. No experience required, profits  
large, exclusive territory to right parties.  
Don't delay writing for free catalogue and  
full information. Doud Lighting Co., 175-F  
No. Sangamon, Chicago.

**Business Opportunities**

AUTOMOBILE SPECIALTIES AND SUP-  
ply business having a large storage bat-  
tery selling, recharging and repair depart-  
ment; having the exclusive sales agencies  
on three of the best selling staple accesso-  
ries with a large territory. Established  
about six years. Location Western New  
York State. Reputation the best. A rare  
opportunity for a very profitable investment  
of \$10,000, allowing for working capital. Ad-  
dress Box D 587, c/o Motor Age.

**BUSINESS OPPORTUNITY.**

Will sell one-half or whole interest in first-  
class, old-established retail automobile busi-  
ness in city of 75,000, located within 150 miles  
of Chicago. Oldest salesroom in city and  
controls three first-class agencies; many  
orders booked for 1914 delivery. Best of rea-  
sons for selling. Address Box E 1, c/o Motor  
Age.

FOR EXCHANGE—160 ACRES IRRIGATED  
farm; fine improvements; nets better than  
\$5,000 yearly. Want fire-proof building suit-  
able for garage and machine shop. Box E10,  
c/o Motor Age.



**FOR SALE**

Garage business established since 1903, one-half block from leading hotel, on Lincoln Highway. Doing good business. Equipped to do all kinds of repair work, with or without car agencies, in a city of 30,000. Address Box E 7, c/o Motor Age. m

**FOR SALE—AN ALL MODERN GARAGE** and Machine Shop in a city of 20,000 population. Ford Agency and largest storing capacity in city. Address Box D 590, c/o Motor Age.

**FOR SALE—ONE OF THE BEST GARAGES** in a growing southern city of eighty thousand inhabitants; absolutely fire-proof; four stories; established 1905; have handled the same car for seven years. Does a large storage and repair business. This is a good proposition for a live man. Address Southern Garage, care Motor Age. c

**FOR SALE OR TRADE.**

Up-to-date, modern garage and auto supplies. Address Box E 11, c/o Motor Age. r

**FOR SALE—PATENT NO. 1064273, JUNE 10/13.** For sale, Force feed carburetor. Cash or bonus and royalty. R. B. W., 209 South Ave., Wilkesburg, Pa.

**GARAGE BUSINESS, INCLUDING MACHINERY, tools and equipment.** Thoroughly up-to-date building, low rental. Capacity 50 cars. \$2,500 will purchase this business. Owner wishes to retire. Address P. O. Box 640, Albany, N. Y. k

**GARAGE FOR SALE—BEST EQUIPPED,** best advertised, money making garage in central Nebraska, on Lincoln Nat'l Highway. Blue Book garage of the city; a bonanza; books will show it.

KEARNEY AUTO CO.,  
Kearney, Neb.

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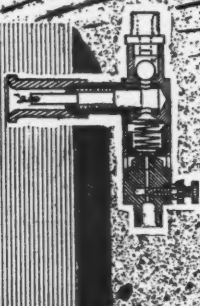
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(Continued on Page 226.)



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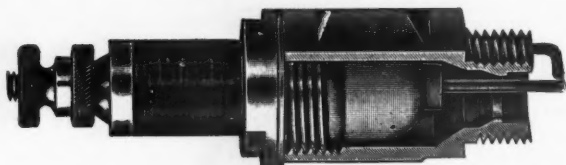
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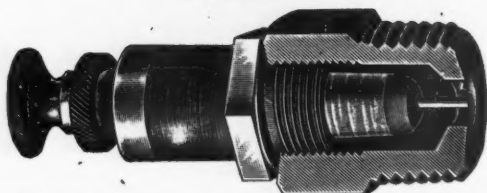
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## Index to Advertisements

### A

Acme Torsion Spring Co... 203  
Adams & Westlake Co... 128  
Adamson Mfg. Co... 221  
Alma Motor Truck Co... 116-117  
American Ball Bearing Co... 219  
American Bronze Co... 1  
American Electric Co... 223  
American Voiturette Co... 193  
Apple Electric Co... 210  
Arsenal Varnish Co... 208  
Atwater Kent Mfg. Wks. Cover  
Automobile Appliance Co... 134  
Auto Specialty Mfg. Co... 223

### B

Badger Brass Mfg. Co... 216  
Barnes, W. F. & John Co... 201  
Barthel & Daly... 217  
Bartholomew Co... 202  
Beach, T. C. Auto Turn-  
table Co... 226  
Benham Mfg. Co... 216  
Benton, L. F. Co... 221  
Blood Bros. Machine Co... 218  
Booth, N. E... 110-111  
Bosch Magneto Co... 218  
Braender Rubber & Tire Co... 218  
Brennan Motor Mfg. Co... 220  
Brietson Mfg. Co... 220  
Bridgeport Brass Co... 216  
Briggs-Detroit Co... 219  
Broderick & Bascom Rope  
Co... 143  
Brown Co... 213  
Brown-Taylor-Greene Co... 178  
Buckeye Mfg. Co... 121  
Buda Co... 206  
Buick Motor Co... 94-95  
Buob & Scheu... 226  
Byrne, Kingston & Co... 219

### C

Cadillac Motor Car Co... 131  
Cameron Mfg. Co... 217  
Carr, F. S. Co... 129  
Carron & Co., Inc... 211  
Cartercar Co... 136  
Chadwick & Trefethan... 226  
Chicago Automobile Supply  
House... 226  
Classified... 227 to 233  
Clearing House... 224-225-226  
Cleveland-Canton Spring  
Co... 138  
Commerce Motor Car Co... 192  
Connecticut Shock Absorb-  
er Co... 215  
Connecticut Tel. & Elec. Co... 215  
Continental Motor Mfg. Co... 190  
Convertible Automobile  
Body Corp... 108-109  
Corbin-Brown Speedometer  
235  
Coreoran Lamp Co... 221  
Covert Motor Vehicle Co... 223  
Cox Brass Mfg. Co... 210  
Crown Prince Metal Works  
177  
Cullman Wheel Co... 147

### D

Dann Oil Cushion Spring  
Insert Co... 183  
Dayton Rubber & Mfg. Co... 221  
DeSoto Motor Car Co... 222  
Detroit Steel Products Co... 179  
Dorris Motor Car Co... 222  
Double Fabric Tire Co... 146  
Dover Stamping & Mfg. Co... 209

### E

Eisemann Magneto Co... 214  
Electric Auto-Lite Co... 133  
Electric Storage Battery Co... 137  
Empire Automobile Co... 182  
Empire China Works... 213  
Englebert Tyre Co... 152

### F

Fair, The... 187  
Federal Rubber Mfg. Co... 132  
Firestone Tire & Rubber Co... 149  
Fisher Electrical Co... 200  
Ford Motor Co... 219  
Fulton Co... 199

### G

Gabriel Horn Mfg. Co... 211  
Gibson Automobile Co... 164  
Gilbert Mfg. Co... 203  
Golden, Belknap & Swartz  
Co... 220  
Golde-Patent Mfg. Co... 221  
Goodrich, B. F. Co... 181  
Gray & Davis... 166  
Gurney Ball Bearing Co... 142

### H

Halliwell Co... 213  
Ham, C. T. Mfg. Co... 223  
Hanline Bros... 215  
Hartford Suspension Co... 2  
Hassler, R. H... 226  
Haynes Automobile Co... 222  
Haywood Tire & Equipment  
Co... 216  
Henderson Motor Car Co... 216  
Herff-Brooks Corp... 217  
Herreshoff Motor Co... 185  
Herz & Co... 223  
Hess Spring & Axle Co... 222  
Holley Bros. Co... 226  
Horat, J... 220  
Hotel LaSalle... 210  
Hotel McAlpin... 196  
Houk, Geo. W. Co... 212  
Hoyt Electric Instrument  
Works... 226  
Hupp Motor Car Co... 191  
Hyatt Roller Bearing Co... 223

### I

Ideal Steel Wheel Co... 171

### J

Jeffery, Thomas B. Co... 124-125  
Jewel Elec. Co... 226  
Jiffy Auto Curtain Co... 170  
Johns, H. W. Manville  
Co... 153-201-209  
Jones Electric Starter Co... 222

### K

K-W Ignition Co... Cover  
Kellogg Mfg. Co... 127  
Kimball Tire Case Co... 214  
King Motor Car Co... 139  
Kissell Motor Car Co... 140  
Knox Automobile Co... 217  
Kokomo Electric Co... 218

### L

Lexington-Howard Co... 167  
Lincoln Highway Assn... 212  
Literary Digest... 144  
Long Distance Spark Plug  
Co... 198  
Lovell-McConnell Mfg. Co... 91



# Index to Advertisements

## M

McCormick Mfg. Co.....	213	Sharrer Patent Top Co....	221
Manzel Bros. Co.....	206	Sheldon Axle Co.....	148
Maxwell Motor Co.....	162-163	Simplex Specialties Co....	221
Mayo Mfg. Co.....	151	Smith, Winton L.....	217
Mercer Automobile Co....	218	Sparks Withington Co....	216
Metal Specialties Mfg. Co.	207	Speedwell Motor Car Co.	122-123
Metallic Automobile Mat-		Spicer Mfg. Co.....	195
ting Co.....	214	Splitdorf Electrical Co....	172
Metz Co.....	222	Standard, The, Co.....	222
Moline Automobile Co.	96 to 107	Standard Oil Co.....	220
Mosler, A. R. & Co.....	221	Standard Woven Fabric Co.	130
Motometer Co.....	215	Star Ball Retainer Co....	218
Motor Car Supply Co.....	226	Steam Carriage Boiler Co.	226
Motor Devices Co.....	173	Stearns, F. B. Co.....	236
Motsinger Device Mfg. Co.	197	Sternberg Mfg. Co.....	119
Mutty, L. J. Co.....	126	Stewart-Warner Speedom-	
		eter Corp. ....	115
		Stromberg Motor Devices	
		Co. ....	89
		Stutz Motor Car Co.....	189
		Sulzberger & Sons.....	3

## N

National Motor Vehicle Co.	165
National Standard Co....	197
New Departure Mfg. Co....	180
New Era Spring & Special-	
ty Co. ....	222
New York & New Jersey	
Lubricant Co. ....	218
Nordyke & Marmon Co....	194
Novelty Leather Works...	118

## O

Oakes & Dow Co.....	234
Olds Motor Works.....	93
Overman Tire Co.....	212
Oxygen Decarbonizer Co..	219

## P

Pagin, J. R. Lamp Co.....	219
Paige-Detroit Motor Car	
Co. ....	112-113
Partin Mfg. Co.....	176
Paxson, C. D.....	135
Peacock, Clarence N. & Co.	204
Perkins-Campbell Co.....	205
Pilot Car Sales Co.....	218
Platt-Washburn Refining	
Co. ....	186
Polo Pneumatic Alarm Co.	220
Pope Mfg. Co.....	114
Poyer, D. F. Co.....	156-157
Premier Motor Mfg. Co....	
	120a to 120d
Prest-O-Lite Co.....	175
Prosser, Thos. & Son.....	223
Pullman Motor Car Co....	219

## R

Rayfield Carburetor Co....	151
Regal Motor Car Co....	160-161
Remy Electric Co.....	208
Republic Rubber Co.....	216
Reo Motor Car Co..Back Cover	
Robbins, Irvin & Co.....	210
Roffy-Grace Corp.....	208
Rutenber Motor Co.....	145

## S

Schrader, A. Sons.....	199
Searchlight Gas Co.....	217
Shaler, C. A. Co.....	219

## T

Taylor Mfg. Co.....	223
Troy Wagon Works Co....	214
Twitchell Gauge Co.....	207

## U

U. S. Ball Bearing Co.....	168
Universal Portland Cement	
Co. ....	204

## V

Vulcan Mfg. Co.....	169
---------------------	-----

## W

Wadhams Oil Co.....	215
Ward Leonard Electric Co.	217
Warner Gear Co.....	184
Warner Mfg. Co.....	217
Weaver Mfg. Co.....	198
Weed Chain Tire Grip Co.	
Front Cover	
Weld Mfg. Co.....	234
Wenborne-Karpen Dryer	
Co. ....	141
Westcott Motor Car Co....	205
Western Electric Co.....	212
Westinghouse Electric &	
Mfg. Co. ....	158 & 159
Weston Electrical Inst. Co.	214
Wheeler & Schebler.....	90
White, The, Co.....	4
Whitmore Mfg. Co.....	220
Whitney Mfg. Co.....	208
Willard Storage Battery Co.	93
Willys-Overland Co.....	174
Winton Motor Car Co....	216
Wisconsin Motor Mfg. Co.	120

## Y

Yuster Axle Co.....	154-155
---------------------	---------

## Z

Zenith Carburetor Co.....	202
---------------------------	-----

# The Guarantee Given With the



*"The Speedometer of Absolute Accuracy"*

*was the first guarantee fair to the car manufacturer, fair to the dealer, and fair to the consumer.*

No attempt was made to stimulate sales through an extravagant guarantee which would eventually have to be revoked.

We issued a guarantee that completely insured a full year of service—no more—no less. We did not endeavor to dazzle the unsuspecting with claims as untenable as they were spectacular.

The result has been that where others have hedged, modified, and radically changed their guarantee, the Corbin-Brown's guarantee has never been altered. It is the same today as when the Corbin-Brown was first introduced.

## The Guarantee:

The Corbin-Brown Speedometer is guaranteed for twelve months from date of sale. We will replace any defective parts due to mechanical defects or workmanship, if returned prepaid to our factory subject to our inspection.

## The Corbin Screw Corporation

THE AMERICAN HARDWARE CORPORATION, Successors

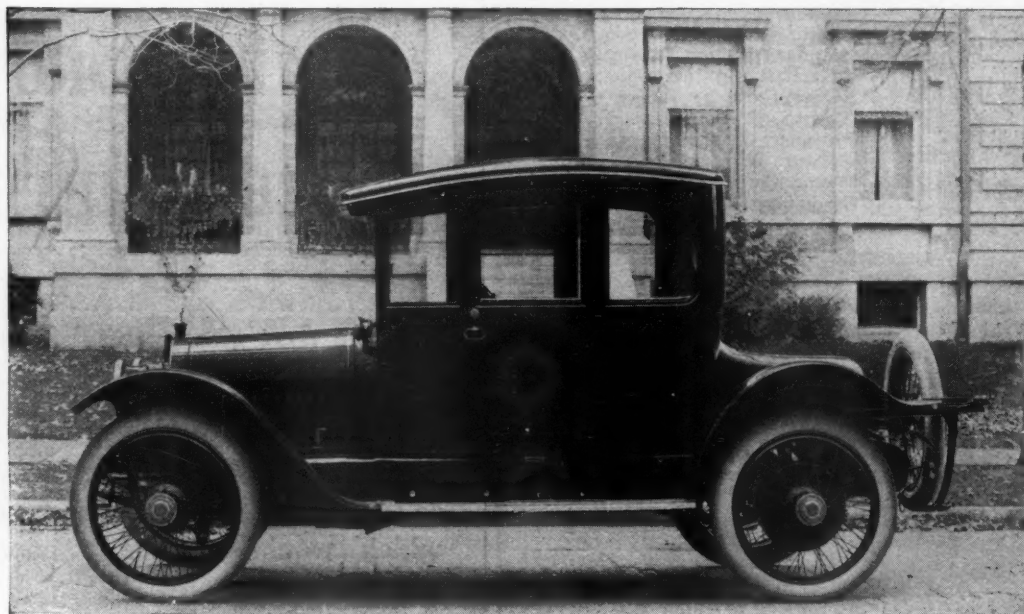
New Britain, Conn.

BRANCHES: New York Chicago Philadelphia

*When Writing to Advertisers, Please Mention Motor Age.*



## A New Stearns-Knight Closed Car



Stearns-Knight Four-Cylinder Coupe (Wire Wheels Extra)

**T**HE Stearns-Knight Coupe—one of the four new body types added this season—combines the luxury and comfort of the Limousine with the convenience and adaptability of the Roadster. Its beautiful lines and finish and exquisite interior treatment, combined with the smoothness, flexibility and unfailing reliability of Stearns-Knight chassis construction, adapt it alike to social purposes and every-day use about town. With the Sedan—another new closed body added this year—it rounds out to completeness the Stearns-Knight line of luxurious closed cars.

Price: Four-cylinder \$4450.00, Six-cylinder \$5550.00  
Other Models \$3750 to \$6200

Catalog upon request.

**THE F. B. STEARNS COMPANY**  
CLEVELAND, OHIO



# ALL OVER THE WORLD

Master Vibrators  
Road Smoothers  
Spark Coils



High & Low Tension  
Magnetos & Head  
Lighting Outfits

are giving satisfactory service to thousands and thousands of owners of large and small cars

## Every Third Ford

is equipped with a



### Master Vibrator

because it gives  
More Power—A Hotter Spark  
A Smoother Running Engine  
Easier Starting  
One adjustment instead of four  
Uses less gasoline  
Cleaner Spark Plugs  
Less Carbon Deposits

It takes place of four separate vibrators in your coil, giving you one fast vibrator and a powerful condenser, which insures absolute synchronism.

It costs but \$15.00 and can be put on in half an hour; change in the car not necessary.

The K-W Master Vibrator is the Standard of Excellence all over the world.

Write for descriptive folder today.

## All Roads Seem Smooth

You drive with comfort and save your car and tires when you equip your car with



### Road Smoother

"Just like riding on air"

Built especially for Ford cars  
Not a Shock Absorber but a Shock Preventer  
Easy to apply  
Stops Vibration  
Saves Tires

Price for Set of Four, \$25.00.

The K-W Road Smoother is a combination of a spring hanger and a coil spring which acts in harmony with the regular spring hangers on a Ford Car. They take up the little jars that the larger springs cannot absorb.

They soon pay for themselves by effecting fuel and tire economies so the increased comfort costs nothing.

Write for full particulars and illustrated literature.



The



### Electric Headlight Outfit

will bring your old or new car up to date. The complete outfit—Electric Generator, Head Lamps, Switch, Wire and Bulbs—only \$40.00.

Write for complete information and descriptive folder. We also make the Ford Outfit for Fly Wheel Magneto, \$15.00.

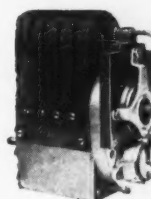
The



### High Tension Magneto

is the strongest magneto made, insuring absolute synchronism and requiring no coil timer or batteries.

Send description of your engine and ask for descriptive folders and price.



We pay transportation anywhere on K-W Master Vibrator when cash accompanies order.

Give the Street Number →

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CLEVELAND, OHIO, U.S.A.

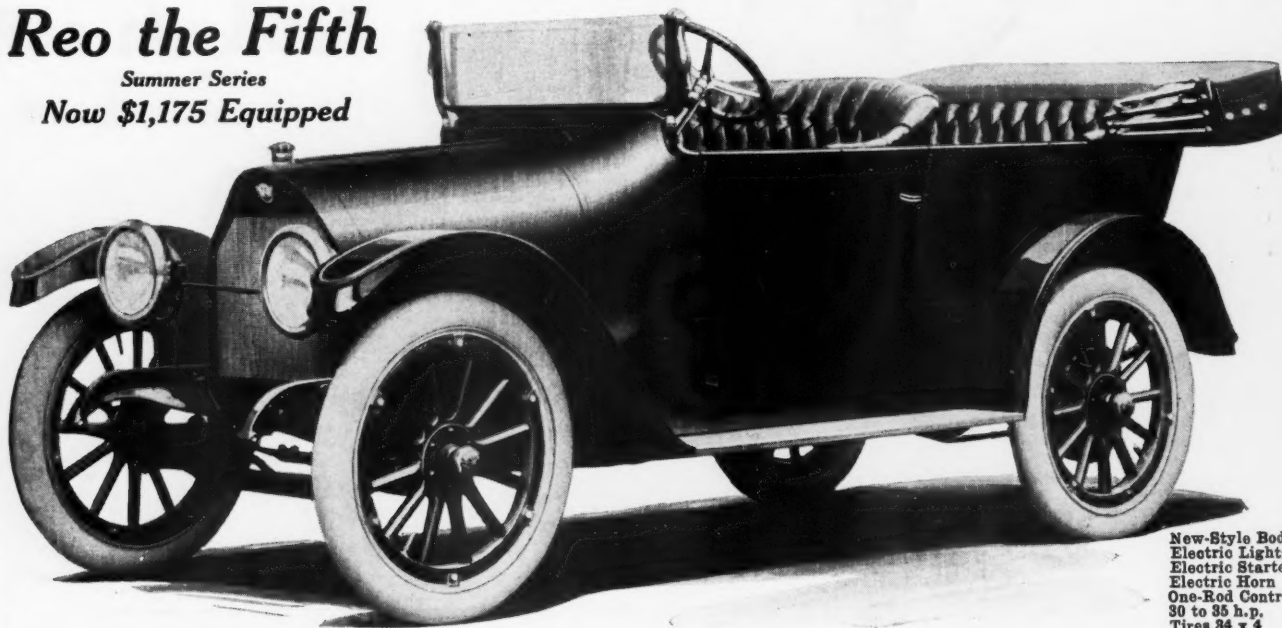
and east of the Mississippi on other K-W products or to the Mississippi for points beyond.



## Reo the Fifth

Summer Series

Now \$1,175 Equipped



New-Style Body  
Electric Lights  
Electric Starter  
Electric Horn  
One-Rod Control  
30 to 35 h.p.  
Tires 34 x 4  
Also Roadster

# We've Saved You \$220

Three years ago Mr. R. E. Olds brought out this famous chassis. He was the dean of designers. For 25 years he had led the way toward better and better cars.

He said that this car marked his limit. No cost, no skill, no care could build—so far as he knew—a better car of this size and power.

Men who knew Mr. Olds believed him. This car has had a remarkable

sale. Nearly every month the demand for the car has far exceeded the output.

Like every new model, this car involved an immense investment in new machinery, new tools and jigs, etc. This investment was charged off at so much per car, until now it is all wiped out.

Now this item is deducted from the price. So with the savings on elec-

tric starters, on tires and on other things.

As a result, this year's design in Reo the Fifth sells for \$1,175, equipped as above. That is \$220 less than last spring's price, completely equipped, with electric starter and lights.

The same chassis, a beautiful new-style body, many new ideas in up-to-date equipment, and a saving of 16 per cent.

## The Utmost in an Honest Car

Reo the Fifth simply typifies its builder—a man cautious, honest, experienced and extreme.

Each car is built just as Mr. Olds would build it for himself.

The steel is twice analyzed. The gears are tested in a crushing machine for 75,000 pounds per tooth. The springs are tested for 100,000 vibrations.

The car has 16 roller bearings, where common ball bearings would cost one-fifth as much. It has 190 drop forgings, where castings would cost half as much.

Each driving part, at much added cost, is given 50 per cent over-capacity.

The car is built slowly and carefully. The output is limited to 50 cars daily. There are countless tests and inspections. Parts are ground to utter exactness, regardless of time or cost.

Each engine gets five long tests, three of which are extreme and unusual. Then every engine is taken apart and inspected.

Every car gets this extreme attention. Sometimes dealers are crying for cars. Sometimes orders are five times the output. But not a car goes out until every inspector pronounces each part perfect.

### The Result

The result is a car which, right from the start, performs its level best. No adjustments are needed.

Weaknesses and flaws don't develop. And the little troubles, due to careless detail, are absent in this car.

Upkeep is very low. This careful construction saves the owner many times what it costs the maker.

And the car keeps new. One of these cars was taken apart

after 10,000 miles of hard driving, and the important parts showed hardly any evidence of wear.

A car that's skimped and hurried may look and run like Reo the Fifth when new. But a few months' use shows up the difference, as it does with a shoddy coat.

Mr. Olds says, "I am building these cars for what men will say of me five years after they buy them."

### The New Beauty

This year's improvements lie mainly in beauty. Note the new-style streamline body. The upholstery is deep and soft. The rain-vision windshield is made part of the car. The searchlights have dimming attachment.

Electric lights and starter, electric horn, speedometer, top and side curtains, extra demountable rim.

The instrument board, with all instruments set flush, is brought within reach of the operator.

This is by far the most beautiful car that ever went from the Reo factory.

### One-Rod Control

This car alone has our one-rod control. All the gear shifting is done by one center rod set entirely out of the way. It is done by moving this rod only three inches in each of four directions.

No levers in the driver's way. Both brakes are operated by foot pedals. The driver's entrance from either side is clear.

We have dealers in a thousand towns. Go see the new body, the new ideas in equipment. And to know what men get inside this car, write for our catalog.

## Reo Motor Car Company, Lansing, Michigan

Canadian Price, \$1,575. Factory, St. Catharines, Ont.